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What Is Past, Is Prologue

INTEREST in historical studies has been greatly stimulated in recent years, and the reason for this is obvious. Ours is an age of crisis and social upheaval, and a generation that finds itself a part of this all-encompassing historical process cannot help but reflect on the events which it sees and in which it participates. Reflection inevitably leads to an endeavor to analyze and to determine the causes and mechanisms that have produced these events; and this development in turn leads to an interest in history. For there can be little doubt that the historical approach is invaluable in comprehending the nature of difficult problems.

History is one of the most powerful driving forces in human development. Every situation that man has faced and every problem that he has had to solve have been the product of historical developments and processes. Furthermore, the way in which we act is, in large measure, determined by the mental image of the past that we have created. To understand our own society, to be capable of playing an intelligent role in shaping our own civilization, we must have knowledge of the actions of the past. But this is not enough. We must have a knowledge not only of the actions of the past, but of the mental struggles, the ideological and philosophical conflicts that preceded action. For as R. G. Collingwood, the British historian and philosopher, pointed out. "There are not mere 'events' in history: what is miscalled an 'event' is really an action, and expresses some thought (intention, purpose) of its agent; the historian's business is to identify this thought." Without sound historical knowledge, men act instinctively and emotionally, but not rationally.

The relevance of these ideas to medicine and its history is clear. Medicine as a vital element of human culture cannot remain impervious to the prevailing climate of opinion. We all know how vital has been the role of medicine and the medical profession in the present world conflict. History is replete with evidence that the maintenance of health is essential for the successful outcome of military operations. Nor can we overlook the fact that disease has often been a major factor in shaping the destiny of nations.[1]

[1] Henry E. Sigerist: *Civilization and Disease.* Ithaca, N. Y., Cornell University Press, 1943 (especially Chap. V). Also John Saltmarsh: Plague and Economic Decline in England in the Later Middle Ages. *Cambridge Historical Journal*, 1941, *8*: 23–41.

There is still another and equally important aspect of the history of medicine. The medical thought of the past is an important cultural element in the training of every physician, and of every person connected in any way with the provision of medical care. It is an essential element of our culture and thus the concern of everyone. In periods of crisis, the preservation of culture is imperative; it is a task the significance of which cannot be estimated highly enough.

During the past seventy-five years a large part of the medical profession has turned away from the history of medicine. This development is comprehensible as a part of the change in the total outlook of our society, the increasing specialization of medicine, and of changes in education. We sincerely believe that this trend has resulted in a serious loss for a profession which by implication still acknowledges the importance of the historical approach each time it writes or speaks of the *case history*. In part, also, the onus for this trend may be attributed to medical historians who were not always able to make medical history the living, dynamic thing that we believe it to be. We do not want to cultivate medical history as a mere search for antiquities, as a kind of hunt for curios, but rather as a vital, integral part of medicine. We believe this can be done.

For these reasons the JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES has been organized. At present there is in the United States only one other publication in this field, the *Bulletin of the History of Medicine*, edited by Dr. Henry E. Sigerist. It is the purpose of the JOURNAL to provide another focus for studies in medical history. It will not compete with, but will supplement the *Bulletin*. We welcome contributions on all aspects of the history of medicine, public health, dentistry, nursing, pharmacy, veterinary medicine and the various sciences that impinge on medicine. It is our feeling also that papers dealing with limited and specific subjects might well be supplemented by occasional articles of wider scope that would summarize certain important fields and outline the broad trends in them. From time to time the JOURNAL will request competent investigators to prepare such special review articles.

Finally, we wish to emphasize that medical history is now being made. The role of medicine in World War II, as well as its part in the post-war period, is undoubtedly of high interest for the student of medical history. We shall also welcome, therefore, papers dealing with the evolution of these current developments. While the scope of the JOURNAL will be as broad as possible, it will not publish bibliographies or papers of a philo-

logical nature, feeling that the *Bulletin* is the proper channel for studies of this kind. Consequently, we shall not stress the technical (philological, bibliographic) aspects of medical history, but will endeavor, while maintaining the highest literary and scholarly standards, to present studies that can be of interest to as large a section of the medical profession as possible.

Despite differences of thought and presentation in the varied content of the JOURNAL, its basic idea is and will be the thought of Terence: *Nothing is so difficult but that it may be found out by seeking.*

GEORGE ROSEN

Some Galenic and Animal Sources of Vesalius

CHARLES SINGER*

I. Introduction

It is well known that the anatomical descriptions of Galen are not drawn from bodies of men but of animals and especially of apes, and that the form he dissected was the Barbary ape, *Macaca inua*. It is equally common knowledge that Vesalius violently and repeatedly denounces Galen and those who follow him for describing animal structures while professing to give an account of the human frame. Yet it is from animals that Vesalius drew many anatomical conceptions, not only for his early *Tabulae* (1538) but also for the *Fabrica* and *Epitome* (1543), as we shall presently show moreover, many of his anatomical descriptions are taken rather from the text of Galen than the book of Nature. Nevertheless neither his censoriousness nor his errors should be too readily condemned. They must be judged in their own peculiar atmosphere. It is much less easy to forgive the gratuitous obscurity and studied verbosity of his descriptive writing.

Vituperative criticism was almost normal to the humanist literary tradition of his day. Not a few distinguished Renaissance scholars produced their greatest works in moods which seem to us now both childishly irritable and flatulently abusive. Difference of opinion on a purely technical point was often expressed in language of the coarsest insult. Maliciously false references to the character of opponents were current forms in literary debate. Denunciations by Vesalius must therefore be read with the detestable literary manners of his age in mind. Among humanist writers he may fairly be described as quite moderate in tone.

Nor was it reprehensible in itself for Vesalius to draw on the anatomy of animals. Indeed it would have been remembered to him for righteousness had he not protested too much and too often that he alone described only the parts of man. The reliance on comparative methods gave a special distinction to the Paduan anatomical school that he founded. Without an appeal to animal bodies what could have been the achievement of Fabricius and Coiter, Harvey and Casserius and other great Paduans?

* The preparation of this article has been aided by a grant from the Trustees of the late Sir Henry Wellcome.

Certainly Vesalius dissected far more animals than men. That was as it should be. For investigating many points animal bodies are better adapted than human, and dissection of animals could be conducted in his own chamber. A glance at the scene depicted in the frontispiece of the *Fabrica* raises the reflexion that privacy must have been the pressing need of this noisy, bustling, exhibitionist genius.

FIG. 1. From one of the great muscle figures of the *Fabrica* (1543 p. 184). The right clavicle is turned back. The upward extension of the rectus abdominis as far as the first rib is a definitely simian feature. Vesalius writes: "The line *r* marks the termination of the fleshy part of the rectus abdominis. That muscle ends here in man as we have displayed in the previous figure. In the space between *r* and *f* is shown the tendon or membrane or non-muscular part of the rectus abdominis muscle of the ape, *t* being a fleshy part attached to the first and second ribs; *u*, *u*, *u* are the tendinous intersections in man in whom the muscle extends upward to the fifth rib as shown."

The anatomical vision of Vesalius was thus perforce a patchwork construction. Its basis was necessarily the dissection of animals and perhaps of still-born children. The results were corrected and checked at intervals from the corpses of adults. That is the best that could have been. It is

highly significant that the vision of the *Fabrica* became at once so complete and so unified. And remember that it was indeed a vision, for Vesalius is ever considering the complete living human form. It is that which the work seeks to conjure up for the reader.

There certainly remain many details of animal anatomy in the *Tabulae* (1538), and in the *Fabrica* and *Epitome* (1543), that have not been corrected, or have not been corrected fully, by human reference. It is not remarkable that these should be more evident in the earlier than in the later work.

Vesalius was very familiar with the anatomy of the ape. In the *Fabrica* he often refers to the way in which simian structures differ from human. A good example is to be seen in one of the great muscle figures of the *Fabrica* in which he portrays the rectus abdominis muscle of the ape and compares it to that of man (Fig. 1). Again Vesalius knows that there is in the right lung of the ape a lobe unrepresented in man, which embraces completely the *vena cava inferior* in part of its course (Fig. 2). It is evident, from many passages, that he had often dissected apes. He describes his preparation of the skeleton of one at Bologna in 1540.[1] It is however very improbable that he had examined the actual species used by Galen, the Barbary ape. *Macaca inua* is now very rare and was becoming so in the time of Vesalius. (I have had the opportunity of dissecting one.) On the frontispiece of the *Fabrica*, however, there is a representation of *Macaca mulatta*, the common rhesus monkey (Fig. 3). This hardy creature is native to Northern India and specimens were to be found in the markets of Venice and other ports of the Eastern trade. This would doubtless be the kind anatomised by Vesalius. For such purposes the differences between species of Macaca are of no significance.

I hope to convince the reader that the vascular system as pictured and described by Vesalius was influenced by his knowledge of that of the rhesus monkey and of other animals. I do not suggest that he did not dissect and describe the great vessels and thoracic contents of man. On the contrary I am sure that he did, and that he figures them in certain places in the *Fabrica*. The book in which he does so (*Liber VI*) is, however, the weakest of the seven in that work. What I claim is that the anatomy of the heart and vessels of certain animals, notably of the ape, was early and deeply impressed on his mind. In his accounts of such parts, it is those of animals, and especially of the ape, that he habitually presents in his general

[1] *Fabrica* 1543, p. 78.

schemes and often visualises in his detailed descriptions. Moreover, I believe that he did not dissect the great vessels of man nearly as thoroughly as is commonly believed. The simian and animal points that I discuss do not exhaust all those that might be inferred from the Vesalian accounts of the thoracic organs.

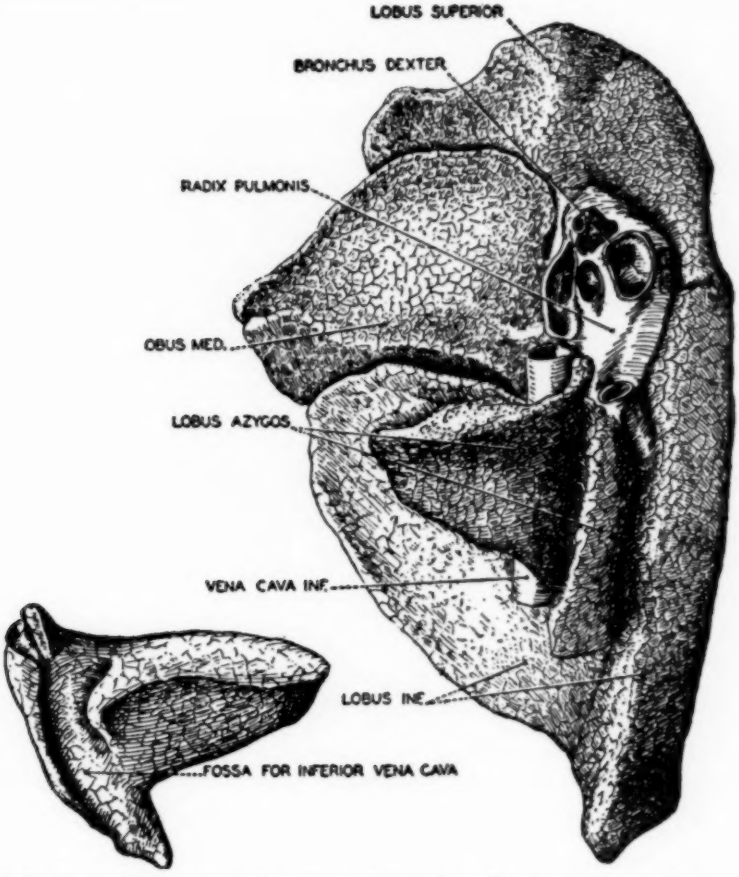

FIG. 2. Right lung of Rhesus monkey, posterior surface. The inset shows the azygos lobe which Vesalius refers to in the *Fabrica* 1543, p. 280.* He there says that this lobe enfolds a stretch of the *vena cava* as described by Galen (*De usu partium* VI, 4 and VII, 2, Kühn III, p. 421 and 518) but that there is no such lobe in the human lung. From P. Lineback in C. G. Hartman andW. L. Straus *Anatomy of the Rhesus monkey*, Baltimore 1933; reproduced by permission of the Williams and Wilkins Company.

To make intelligible the animal elements in the anatomy of the vascular system as described by Vesalius, it is necessary to say something about his physiological system. His aim was to set forth the *Fabrica*, the 'workings,' of the human body. Therefore to appreciate his anatomy we must understand his physiology which was that of Galen.

II. GALENIC PHYSIOLOGY AND ITS LATIN PRESENTATION

Standing behind all anatomical teaching before the seventeenth century is Galen's physiological system. It is contained in various texts printed in the great early Latin editions of Galen's works. Chief among these are the Giunta of Venice from 1541 onward and the Froben of Basel from 1542 onward. The two represent the same recension and to it Vesalius made certain minor editorial contributions. Until the boyhood of Vesalius

FIG. 3. Representation of *Macaca mulatta* from frontispiece of the *Fabrica* 1543 of Vesalius.

Galenic teaching had reached the student of medicine less through versions of Galen's own works than through versions of Avicenna and of other Arabs and Arabists. But by the time that Vesalius began to study medicine at Paris (1533) the anatomical works of Galen had been translated into Latin by Guenther and others and were in circulation in convenient volumes. Vesalius was certainly an avid reader. He studied the new Latin Galenic texts; but he also studied the Latin Avicenna and other Arabist works far more than most humanists and he had some knowledge of their medieval commentators.

The physiological views of the Middle Ages, being inherited from Galen could, with slight adjustment, be made to conform to the newly recovered Galenic texts that were printed in the sixteenth century. The main need was re-expression in the humanist dialect of the time. For this task none was more expert than Giovanni Battista del Monte (Montanus 1498–1551), the most popular medical teacher in North Italy. In 1538 he was called to a chair at Padua where his work was already very well known. Vesalius and Montanus were in intimate contact. In the *Tabulae* Vesalius

was in effect putting into graphic form the physiological teaching of his colleague.[2]

Even with such a teacher as Montanus the art of scientific exposition made no great progress, chiefly because he did not use figures. Vesalius himself had a share in perfecting the technique of scientific instruction by the vast improvement that he introduced in the portrayal of anatomical structures and the representation of physiological processes. It is therefore unfortunate that the clarity of his graphic method — of which he was the first effective pioneer — is obscured by his very involved and highly unsuitable language. The account which follows is an attempt to set out the old physiology in the modern manner. It would be worse than useless to attempt to present a translation of the physiological passages of Vesalius for he could never rid himself of the wearying involutions of his own wretched literary style. A knowledge of Galenic physiology is a lantern in the fog of that humanist verbosity which enshrouds medical discussion of the day.

To understand the old physiology it is of course necessary to shed the idea of a circulation of the blood; but is also necessary to rid oneself of the conception that the passage of the blood through the vessels is a very active and continuous process. Blood (it was held) flows to and from the liver through the veins. Of these the chief are (a) the portal vein, (b) the *vena cava* (the two *venae cavae* being treated as one) and (c) a special diverticulum of the *vena cava* in the thorax, the right ventricular cavity (Figs. 4 and 6). The left ventricle sends out only a specially modified small fraction of the blood. The atria have but a subordinate function; they are mere safety-outlets from the ventricles. With these points in mind we turn to consider the system as a whole.

The basic principle of life in the Galenic physiology is a *spirit*, *anima*, or *pneuma*, drawn from the general world-soul or world-pneuma in the act of respiration. It is a pagan Stoic principle which, strictly interpreted, is inconsistent with Christian, Moslem or Jewish doctrine. This awkward fact is therefore always either slurred or misrepresented or misunderstood or ignored in medieval writings. Thus the medieval physiological system was basically unintelligible as, for that matter, is our own. With the advent in the sixteenth century of translations of the more philosophic

[2] The fullest expression of the physiological views of Montanus is in the work of his Polish student Valentine of Lublin. It is in effect a notebook of his master's lectures. *J. B. Montani . . . . in primam Fen Libri primi Canonis Avicennae Explanatio* Venice 1554. It gives an exceptionally good account of the physiological outlook with which Vesalius started.

works of Galen, and in the semi-pagan atmosphere of Renaissance humanism, current physiology took a form nearer to its original.

Nevertheless the 'world-soul' of Galen and of the Stoics (as well as of the heretical Christian and Jewish Averroists, whose stronghold was at

FIG. 4. Central part of a general scheme of the venous and arterial systems from the *Fabrica* 1543 (between pp. 112 and 113) repeated in the *Epitome*. The *vena cava* is of the simian type throughout as are the aortic branches, though they cannot be so well seen. The descriptive text runs: "*T* marks position of *vena cava* between *septum transversum* [diaphragm] and heart; *a* Trunk of the *vena cava* opening into right cavity of heart; *b* Right auricle; *d* Trunk of *vena arterialis* [pulmonary artery]; *f* Trunk of great artery [arch of aorta]; *g* Trunk of great artery dipping behind heart [descending aorta]; *h* Upper part of branch of great artery passing to left arm [left subclavian]; *i* Larger branch of great artery [*truncus communis*]. which divides into two unpaired branches of which one *k* is the left soporal [carotid] and the other and greater [innominate artery] forms both *l* the right soporal and *m* the artery to the right arm; *p* Division of *vena cava* into two jugulars. And here on either side at *q* arise veins for the bones of the chest [internal mammary veins]."

Padua) could never be made to fit any picture of the world acceptable to the Church. It is a very old divergence. In the *Gospel according to St. John* there is a familiar passage which approaches and yet avoids this very

antithesis between Stoic and Christian: "That which is born of the Spirit (*pneuma*) is spirit (*pneuma*).... The wind (*pneuma*) bloweth (*pnei*) where it listeth . . . and thou knoweth not whence it cometh; so is everyone that is born of the Spirit (*pneuma*)" (John 3, 6–8). Examination will

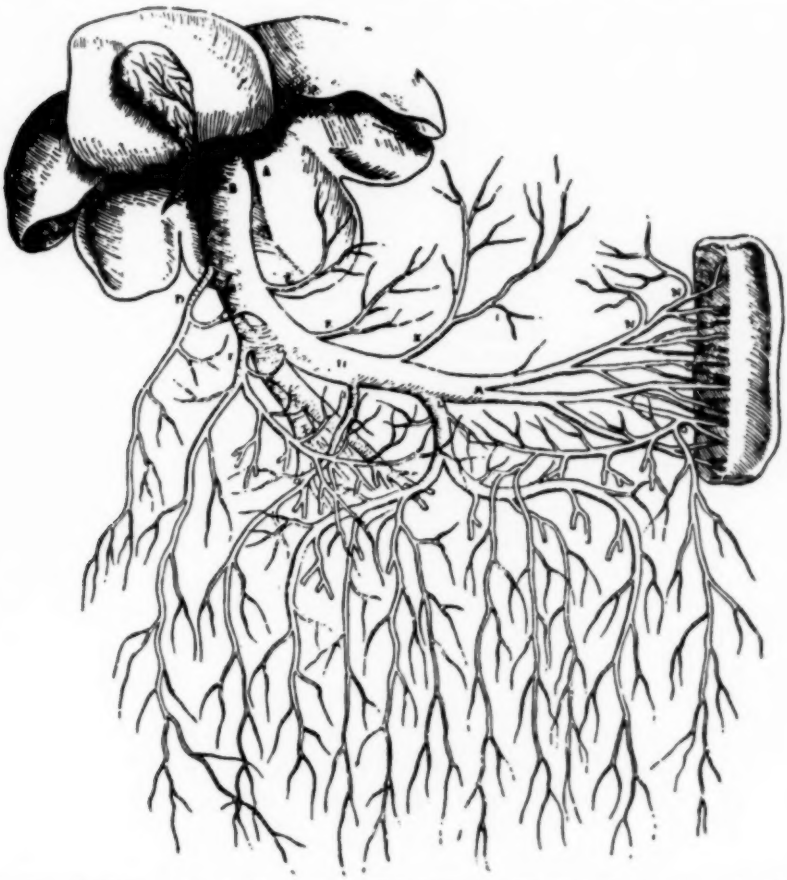

FIG. 5. Portal vein entering the liver, from *Tabulae* 1538. The liver is represented as formed of five equally splayed lobes. This is reminiscent of the ape's liver.

show that even in this short passage the word *pneuma* is used in several different senses. Thus the wind that bloweth is the pneuma of the world but the Spirit of which man is born is a very different kind of pneuma.

This world-pneuma or spirit of Galen enters the body through the trachea or 'rough artery' (*arteria aspera* of the medieval notation). Thence it passes to the lung and thence again, through the vein-like artery or *arteria venalis* of medieval writers (our pulmonary vein), to the left ventricle. Here we leave it for the moment.

Food traversing the alimentary tract, is absorbed as 'chyle' from the

intestine. Thence it is collected by the mesenteric veins into the portal vessel and conveyed by it to the liver (Fig. 5). In that organ the portal vein breaks up. Chyle is thereby elaborated into venous blood and imbued

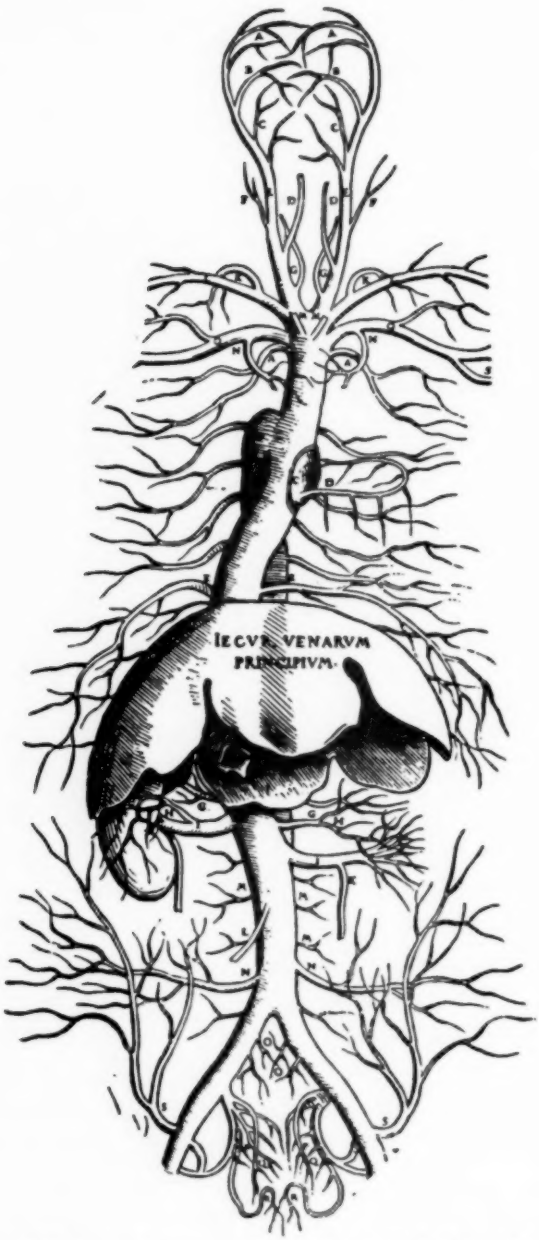

FIG. 6. *Vena cava* from *Tabulae* 1538 represented as arising from the liver with the right ventricle outlined by coronary veins. The vena azygos is greatly exaggerated and the superior vena cava is of ungulate type. Superior and inferior venae cavae form one continuous vessel as in the ape.

with the spirit or pneuma which is innate in all living substance, even of plants. This is the natural spirit (*spiritus naturalis* of the medievals). Charged with natural spirit, but also with the nutritive material from the food, venous blood is distributed by the liver through the systemic veins

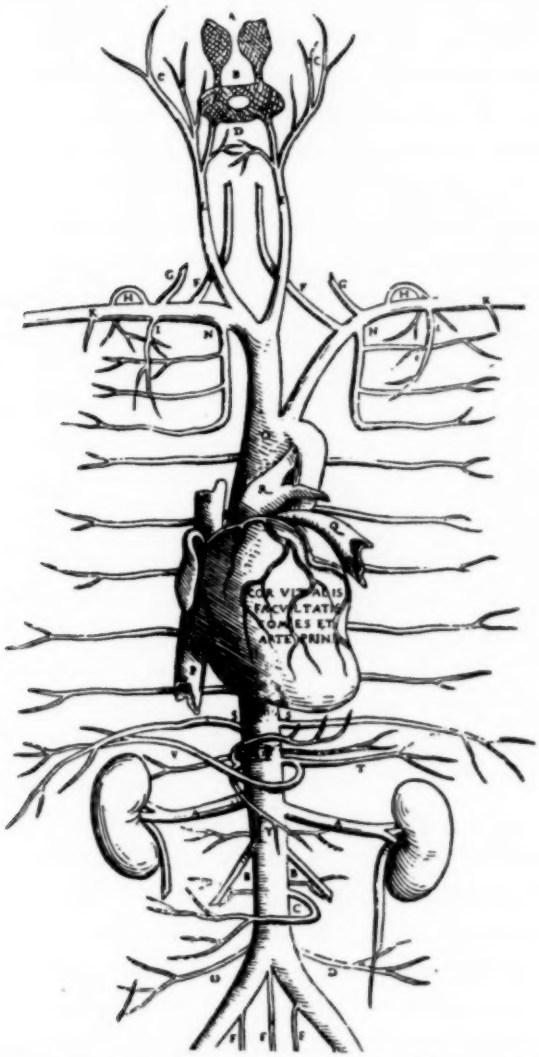

FIG. 7. Arterial System, from the *Tabulae* showing the origin of the *rete mirabile*. The form and position of the heart, the distribution of coronary vessels, the branches of the aorta, the vena cava, and the level of the kidneys are all as in the ape.

and primarily through the *vena cava*. This great vessel arises from the liver (Fig. 6) just as the aorta arises from the heart, that is from the left ventricle. The branches of the *vena cava* carry nourishment and natural

spirit to all parts of the body. *Jecur venarum principium* "the liver, source of the veins," is the first key to Galenic physiology. The blood ebbs and flows continuously in all the veins, including the portal vein.

As the vena cava passes upward it swerves to the left in the region of the heart. At this point it gives off its largest branch. This is a blind diverticulum which is, in effect, the right ventricle plus the right atrium (Figs. 4, 6 and 7). For the blood that thus reaches the right ventricle, two fates are possible:

(a) The greater part remains awhile in the ventricle, parting there with impurities that it has brought from the organs. These are carried off by the *vena arterialis* (our pulmonary artery) to the lung and exhaled thence to the outer air. Such fumes give a poisonous and suffocating character to the breath. Having parted with its vapours, the venous blood ebbs back from the right ventricle into the vena cava and the general venous system.

(b) For a small fraction of the venous blood that enters the right ventricle another fate is reserved. Drops of it, charged still with the natural spirit derived from the liver, trickle through minute imaginary channels in the septum between the ventricles.[3] The only graphic representation that I know of these channels is that of Leonardo (Fig. 8). The fraction of venous blood that passes through them reaches the left ventricle. There it encounters the pneuma from the outer world that has come to it through the *arteria venalis* (our pulmonary vein) from the lung. By the action of this pneuma the blood in the left ventricle, or rather the natural spirit in that blood, is elaborated into a higher and subtler form of spirit, the vital spirit (*spiritus vitalis*). This is distributed by the arterial system to various parts of the body. The action of this vital spirit may be seen and felt in the pulse. *Cor vitalis facultatis fomes et arteriarum principium*, "The heart (that is the left ventricle) nurse of the vital faculty and source of the arteries" is the second key to the Galenic physiology.

Blood containing vital spirit ascends to the brain *via* the carotids, the 'soporal or apoplectic arteries' of Vesalius. These divide at the base of the brain into minute channels to form the *rete mirabile* (Fig. 7). In this 'marvellous network' the blood is again minutely divided. Thereby the vital spirit which it contains is transformed into the third, the highest and most subtle type of spirit, the animal spirit (*spiritus animalis*). This ethereal substance enters the brain and is distributed to the various parts of

[3] These minute channels have, by a misunderstanding, become represented by a 'third ventricle' within the septum in the translation of Avicenna and works derived therefrom.

the body. It passes thither by the nerves which were held to contain minute channels. Pressure on the soporal arteries prevents formation of animal spirit and hence induces faintness or unconsciousness. *Rete mirabile in quo spiritus vitalis ad animalem preparetur* "The wonderful net wherein the vital is elaborated into the animal spirit" is the third key to the Galenic physiology.

According to the pagan Galen, writing under the influence of the Stoic philosophy, the three fundamental faculties, the natural, the vital, and the

FIG. 8. Cavities of the heart by Leonardo da Vinci. *Quaderni d'anatomia*, folio 3 recto. The imaginary pores in interventricular septum are here clearly shown. In the accompanying text Leonardo writes: "The ventricles are separated by a porous wall through which the blood of the right ventricle penetrates into the left ventricle."

animal, which correspond to these spirits and bring into action the corresponding functions of the body, ultimately originate as expressions of the primal soul or world-pneuma. These spirits were well recognised as entities in medieval physiology, though necessarily there misconstrued.

This highly ingenious physiology is not derived from an investigation of human anatomy. It contains elements derived from structures found in animals. Thus in the human brain there is no *rete mirabile*, though such an organ is found in the calf. In the human subject there is no single *vena cava* but two separated *venae cavae* which, however, in the ape, as in the foetus, meet each other and form a continuous vessel. In man the great jugular and subclavian veins do not all conjoin at the same level into a vena cava superior (i.e. anterior) as in the ungulate. Many of Galen's errors were due to his ascription to one creature of conditions found in another. It was one of the achievements of Vesalius to discover and demonstrate this. Nevertheless, he was unable to improve on Galen's physi-

ological scheme. Throughout the *Fabrica* he accepts it, though, as we shall presently see, he throws away one of the keys to Galenic physiology in rejecting the existence of a *rete mirabile* in man. Yet much of the anatomy of Vesalius continued to be based on that of animals. Despite all this it remains true that to him belongs the credit of having made the first attempt to put a physiological system into graphic form (Figs. 5–7).

With the Galenic theory of the action of the vascular system there was combined, in the minds of men of the sixteenth century, the medieval version of the doctrine of the four humours, *Blood*, *Phlegm*, *Black Bile* (Melancholy) and *Yellow Bile*. The four Aristotelian elements, Fire, Water, Earth and Air, were held to be respectively the origin of these four, though Aristotle does not, in fact, mention the humours. The older Hippocratic writings, on the other hand, while they discuss the four humours, make no mention of the four elements. Each of the four humours was associated by the medieval anatomists with a special organ. There are thus four 'principal organs.' Blood arises from the *liver*, Phlegm from the *brain*, Yellow Bile or Choler from the *gall-bladder* — which is thus of peculiar importance — and Black Bile or Melancholy from the *spleen*. Vesalius retained this view. This we shall see specifically for the brain and its 'pituitary gland' which was held to evacuate the humour Phlegm.

III. Rete Mirabile

The method by which a mental process initiates and controls muscular action was as mysterious to the ancient as it is still to the modern philosopher. But the ancient physiologist, like the modern, gave much attention to the mechanism of the nervous system. The elaborate descriptions of the physiologists were, as they still are, apt to mislead the unthinking into the naive error that research has displayed a mechanical intermediary between mind and body. In the Galenic system the *pneuma* of the outer world, modified first into natural and then into vital spirit, was supposed to come to the *rete mirabile* for transformation into animal spirit (*De usu partium* Book IX, Chapter 4). This somehow or other nourishes the mental powers which, directing the same spirit, produce voluntary motion. Thus mind and body were linked. The rete was essential to the working of the system. It contained the central mystery of conscious life, as did the pineal body for Descartes fourteen centuries later.

The actual *rete mirabile* of comparative anatomy is an elaborate network of vessels into which the internal carotid divides at the base of the brain. It is formed by that vessel just before the origin of the chorioid

artery and is a conspicuous feature in Ungulata, including the ox, sheep and pig. Galen had seen it in them. There is a much less developed *rete mirabile* in the Carnivora but no trace of it in the Rodentia or in man or in the monkey. The function of the *rete mirabile* is quite unknown.

The emphasis laid by Galen on this rete would in itself betray his reliance on animals for his anatomical accounts. But more, it shows how strongly his anatomy was controlled by his physiological conceptions, as indeed was that of Vesalius. During the Middle Ages the existence of the rete in man was not doubted. Mundinus (1316) carefully describes it, but adds that it can be well seen in human bodies only immediately after death. The same view is expressed by Estienne (1539 or a little earlier). The practical and independent-minded Berengario (1522) admits that he could not find it, though Massa (1536), an experienced Venetian anatomist with whom Vesalius was in contact, had no doubt of its reality in man.

In the *Tabulae* (1538) Vesalius expresses no doubt of the existence and form of the rete in man. To quote his own phrase, he portrays "a reticular plexus at the base of the brain, the *rete mirabile*, wherein the vital is elaborated into the animal spirit." It surrounds the infundibulum completely. From this circle of the rete two pear-shaped processes pass into the brain. These are the "choriform plexuses formed from arteries and veins in the cerebral ventricles" (Fig. 7). This is the first attempt to represent the rete in a printed book. There are earlier parallels in MSS.

In the *Fabrica*, when he comes to treat the rete, Vesalius acknowledges that he had been describing what was not. He writes: "I cannot sufficiently marvel at my own stupidity; I who have so laboured in my love for Galen that I have never demonstrated the human head without that of a lamb or ox, to show in the latter what I could not in the former, lest forsooth I should fail to display that universally familiar plexus. Yet in no way do the carotids form a plexus reticularis (in man) as Galen alleges" (Fabrica 1543, p. 642).

A franker recantation would hardly be possible. He goes on to discuss the pituitary body, which was supposed to be related to the rete, making some remarkable errors in doing so (Figs. 9, 10 and 11). These errors again are based on Galenic physiology.

IV. The Pituitary Body and the Apparatus for Evacuating Phlegm from the Brain

In medieval and renaissance theory mucous discharges from the nose and mouth were held to be evacuations of the humour 'phlegm' from the

brain (see p. 11). Latin *pituita* is Greek *phlegma*, an equation which recalls our anatomical term 'pituitary body.' The theory was drawn from Galen and notably from a passage familiar to every medical student of the sixteenth century.[4] The account given by Vesalius of the pituitary body and the parts associated with it is, in effect, an expansion of this passage. His description, however, improves little if at all on that of Galen from whom, nevertheless, he expresses his difference vehemently.

FIG. 9

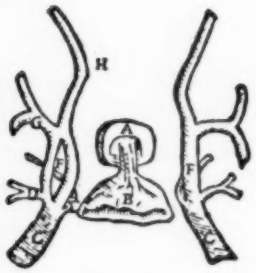

FIG. 10.

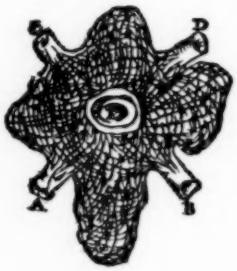

FIG. 11

FIG. 9. From *Fabrica* 1543, Book VII, p. 620. The descriptive text may be translated: "The part of the skull cavity covered with dura which is formed by the os cuneus [sphenoid]; *A*, *B*, parts of visual nerves; *C*, *D*, arteries which, penetrating the dura, are distributed partly to the pia and partly to the ventricles; *E*, here lies the basin [*pelvis*] which receives the phlegm dripping down from the third ventricle [*i.e.* the infundibulum torn from the brain with perhaps part of the tuber cinereum attached]; *F*, aperture through which the end of this funnel-like basin reaches the gland [i.e., the pituitary] which receives the phlegm of the brain [opening in the *diaphragma sellae*]; *G*, *G*, second pair of nerves of the brain [oculo-motor]."

FIG. 10. From *Fabrica* 1543, p. 621. Translation of descriptive text: "We here depict the [pituitary] gland laid bare, with the basin or funnel [infundibulum] which conducts the phlegm down to it hanging flaccid. At the sides we indicate, just as they have appeared to us in dissection, parts of the soporal [carotid] arteries which are alleged to form the reticular plexus. Since they are found variable in dissection, we have drawn variants. *A*, the gland. *B*, the basin or funnel. *C*, *C*, the arteries passing obliquely forward in their own proper channels in the skull."

FIG. 11. From *Fabrica* 1543, p. 621. Translation of descriptive text: "We here represent the plexus falsely, but according to the descriptions of Galen in his work *De usu partium*. *A* and *B* represent the arteries at the base of the cranial cavity which are supposed to break up into that *plexus mirabilis*. *C* and *D* are the vessels into which the branches of that plexus are supposed to be united. They correspond in size to *A* and *B*. *E* is the [pituitary] gland."

I render into English the passage of the *Fabrica* describing the pituitary apparatus. It provides a good illustration of how Vesalius was frequently anatomically misled by a false physiological theory. I find it impossible, however, to convey in English any idea of the endlessly tortuous involutions of the language of Vesalius. My own version contains less than a quarter of the number of words of the passage that it renders. I have broken up the sentences, divided the matter into categories, inserted the marginal indications as headings, omitted any of the repetitions, and tried

[4] *De usu partium* Book IX, Chapter III.

to introduce order into a torrent of verbiage. Some may think that I therefore misrepresent my text and I agree with them. But I do not think that I have imported anything into it nor omitted from it anything that can be of interest.

Translation from *Fabrica* 1543, pages 640 and 641

Summary of parts concerned in discharge of the phlegm

These are: (a) two passages in the brain substance; (b) a funnel shaped portion of the pia; (c) a small gland that receives the narrow end of this funnel; and (d) the passages which conduct the phlegm from the gland to the palate and to the nasal cavities.

(a) *The passages from the third ventricle.* A rather wide passage in the brain-substance[5] descends vertically from the middle of the third ventricle toward that part of the skull where there is a cavity for the accommodation of the gland which receives the phlegm. The second passage I have seldom seen. It appears in dissection as far narrower than the first. It passes from the *iter* between the *testes* and *nates*.[6] As it approaches the testes its anterior or inferior end leads to the front part of the other passage in its downward course and finally opens into it, forming a common channel with it.[7]

(b) *The basin into which descends the phlegm from the brain.* Near the sides of this orifice the pia, which here covers the base of the brain,[8] forms a circular depression or process, like the rest of the pia in substance but with a network of numerous fine veins. In form it is like a funnel (*infundibulum*) for pouring wine into narrow necked flasks, being wide and round above but gradually contracting to a long narrow tube (*fistula*) which descends through its own foramen in the dura, ending at the pituitary gland. This membranous structure resembles a funnel, both in form and function, whence it is called *choanē* by the Greeks and also *pyelos*, after the shape of a drinking horn or of a conch used in the bath, for the upper part is of that shape.[9] . . . The ancient authors who taught Anatomy to tyros, have not given a glandinous name to it. They seem, in

[5] The anterior and lower part of the third venticle as it narrows toward the optic recess and the infundibulum.

[6] Corpora quadrigemina.

[7] The nature of this 'passage' is not clear. It seems to describe the aqueductus Sylvii plus the lowest reach of the third venticle itself.

[8] Vesalius here prints *cerebelli* but he must mean *cerebri*.

[9] I here omit an empty and wordy discussion as to which part is rightly called *choanē* and which *pyelos*. It is probably taken from a Latin version of Theophilus in one of the many editions of the *Articella*.

fact, to omit it from the parts in the skull cavity for want of a proper name for it.[10]

(c) *Account of the gland that receives the phlegm.* This gland is placed beneath the dura in a cavity proper to it, hollowed in the cuneiform bone (sphenoid), the form of which cavity it takes from pressure. It is gibbous and round below but flat above, not quite fitting along the periphery [of the cavity] being a little squarer than its circular outline. It is of a glandular substance but much harder and more compact than other glands. It is covered everywhere by pia which arises either from the bottom of the glandular recess or from the membrane that lines the skull from which the dura here recedes.[11] By the intervention of this membrane, here closely attached to the skull, the gland is strengthened and attached to the main trunks of the soporals (carotids) which pass forward close to it laterally. It is ridiculous that these have been held by the other professors of dissection to form a reticular plexus in man. As though, forsooth, this gland were formed just for these branches rather than determining their distribution as do other glands with their vessels.

(d) *Channels leading from the gland.* Near the sides of this gland there descend on both sides two channels. One passes forwards into a foramen which gives passage to the second pair of the cranial nerves.[12] Of this, contradicting Galen, we say that it much exceeds the foramen of the visual nerve. The other one passes posteriorly through an uneven and rough foramen or cleft,[13] anterior and lateral to the foramen which conveys the main trunk of the carotid into the cranial cavity.

Function and plan of the parts for purging phlegm

All these things minister to the evacuation of the phlegm from the brain. The two passages which we have described as in the brain-substance (*a* above) lead the humour from the [third] ventricle into the infundibulum. This is made wide above, not merely because these [two passages] terminate in a single orifice, but also to embrace the ends of the right and left ventricles which are bent downwards and forward from the back part of the ventricles.[14] These end here because they conduct phlegm from their own region to the infundibulum. Moreover, the infundibulum is made

[10] Galen, in fact, described the infundibulum clearly enough.

[11] He is here trying to describe the *cisterna chiasmatis*.

[12] The second cranial nerves in the notation of Vesalius, are those that we call oculomotor. The large foramen to which he refers in the next sentence is the superior orbital fissure.

[13] The foramen lacerum.

[14] Vesalius is describing a non-existent passage from the inferior horn of the ventricle to the infundibulum.

wide to collect phlegm from above the corpus callosum and the cavities around it, led thither by the pia. For if such a humour descend from either the front or hind part of the corpus callosum, which is arranged like a vault, it can flow down to the pia at the base of the brain and thence slip into the broad end of the infundibulum. The infundibulum, receiving phlegm from all these channels, then narrows down to conduct it through the single foramen made specially for it in the dura, and lets it flow unharmed into the centre of the gland. The gland, by some sympathetic quality [*familiaritas*] of its substance sustains the shock of the flow and, so far as I can conjecture, protects the bone against injury, receiving this phlegm and letting it gradually flow down from its surface on every side without forming drops.

The phlegm flow sthrough all the foramina for the veins, arteries and nerves that pierce the base of the skull. There is none specifically for the phlegm, unless perhaps that cleft round the front and sides of the foramen that carries the main trunk of the carotid.[15] What Galen invents concerning holes like those of a sponge or of a sieve is ridiculous, since there is no hole of this type under the gland.

I would rather have you consider this matter from the structure of the cuneiform bone [sphenoid] on the one hand and from the viscosity and substance of the humour on the other. Weigh it carefully, you who are so devoted to the opinions of authors. Accuse me of impiety as if I were utterly confounding the conclusions of Galen as well as those of all the professors of dissection whom I have read, by which conclusions those authors think to lure us to admiration of our Founder. They do not consider that had God created that bone in the way that they feign, how little foresight He would then have shown. He has in fact made the bone continuous for the accommodation of the phlegm. So far is He from having built it pierced with special foramina (as they themselves invent), that that part of the skull is pierced by many holes for the nerves, veins and arteries. Nay the cuneiform bone [sphenoid] at the very spot where the gland lies on it, has within two large cavities[16] opening by two holes into the cavity of the nose. And if these cavities be absent, as we have once seen them to be in the course of dissection,[17] then the bone itself is there found to be solid like the heel and ankle bones. This shows that there is no discharge of phlegm through special foramina or cavities in it.

[15] Superior orbital fissure.
[16] The sphenoidal sinuses.
[17] The sphenoidal sinuses hardly exist in children and do not attain full development until about the age of puberty.

The phlegm therefore descends to the palate through those foramina which pass towards the palate, but mainly through the foramen of the second pair of nerves near the root of the eyes. It goes thence through a spacious foramen[18] and along many other foramina unknown to other professors of dissection, to the cavity of the nose.

Doubtless here again someone will wonder why I have not enumerated passages leading the phlegm to the sinuses of the organs of smell.[19] It is simply because I do not believe that any phlegm whatever is thus purged. I for my part marvel at their effrontery who have not blushed to write that the phlegm is discharged from the anterior ventricles to the nose through those delicate processes of the brain which we ascribe to the organ of smell. For there is absolutely no passage in them, nor are they in men of sufficient size to provide a passage for the discharge. Add to this that no duct for phlegm to the olfactory sinuses can be imaged which could possibly discharge into them such phlegm as reaches than except perhaps one in front of the corpus callosum. This may perhaps happen when the brain is afflicted by excess of phlegm. And then there is no natural flux of phlegm through the nostrils; but rather an itching, heat, pain, and loss of the power of smell, and other symptoms of that kind. These things arise frequently, as we experience daily in catarrhs which reach the top of the nose, and which we call 'colds' (*gravedines*).

Thus if we consider the matter exactly it must be confessed that no phlegm descends through the sinuses through cribriform or spongiform foramina when man functions according to the law of nature. But if, by some accident, phlegm does go through those channels, the flux is against nature, and then the foramina adjacent to the gland do not discharge all the phlegm but some descends towards the foramen for the transmitting of the dorsal marrow;[20] thence it flows to the back and then along the cavities of the nerves,[21] sometimes to the arms, sometimes to the legs, sometimes to the muscles of the loins, sometimes into other places.[22] I will not discuss how far nature is to blame for having made ducts, for the liquid and watery phlegm, so open and spacious in the cavity of the skull and yet so tortuous and narrow and bent in the eighth bone of the head.[23]

[18] That is to say with the oculomotor nerves through the superior orbital fissure.

[19] The general medieval view, with which Vesalius is expressing disagreement, was that phlegm was purged from the brain through the cribriform plate of the ethmoid.

[20] The foramen magnum.

[21] Vesalius regards the nerves as tubes. They were the normal channels for the spiritus animalis (see pages 15 and 16).

[22] Vesalius is trying to explain the many general symptoms that often accompany nasal catarrhs.

[23] That is the sphenoid.

(*To be continued*)

The London Years of Benjamin Waterhouse

JOSIAH CHARLES TRENT*

On the seventh of March, 1775, Benjamin Waterhouse, then a young man of twenty-one, boarded the ship *Thomas* in the harbor of Newport, Rhode Island, the last ship to have left the blockaded port of Boston. Having served an apprenticeship in medicine under Dr. John Halliburton of Newport, Waterhouse was on his way to complete his professional training abroad. He was leaving behind him a country on the verge of armed rebellion against its king. Six years later, in the course of his long homeward journey, he was to hear that Cornwallis had surrendered at Yorktown.[1] Throughout the Revolution, in which Waterhouse, Quaker bred, could have taken no active part even had he stayed at home he pursued his medical studies in London, Edinburgh, and Leyden, taking his doctor's degree at the latter university on the nineteenth of April, 1780. He returned to Newport in June, 1782, to take his place as one of the most learned citizens of the new republic, and also one of its most opinionated citizens, one must add.

During the formative years abroad, particularly those spent in London, Waterhouse experienced much that contributed to his development. The friends and acquaintances he made there influenced him greatly and profoundly affected his later attitudes and opinions. Examination of his London years, therefore, may give us a better understanding of what motivated his actions on his return to America. Obviously, in this brief study, we can concern ourselves only with the more general phases of his life in London and must leave the details of his medical education for future analysis.

When Waterhouse arrived in London, in April, 1775, he was cordially received by his mother's cousin, the learned and philanthropic physician, John Fothergill.[2] Warmly interested in the American colonies and concerned for their welfare, Dr. Fothergill favored all measures aiming to-

* Department of Thoracic Surgery, University of Michigan Hospital.

[1] Letter from Waterhouse to Jared Sparks, Cambridge, April 30, 1838; original in Harvard College Library.

[2] In the preface to his *Essay on Junius and His Letters* (Boston, Gray and Bowen, 1831), Waterhouse gives a brief autobiographical sketch, from which many of the above statements are drawn. See also the extensive quotations from a manuscript memoir by Waterhouse, in William Dunlap, *History and Progress of the Arts of Design in the United States* (New York, George P. Scott and Co., 1834, I, 162 ff.).

ward the creation of a better understanding between the English and the Americans. Waterhouse later wrote:

> Fothergill went so far as to express in print a wish, that the British government would promote *scholarships* for Americans in their universities; and that they would give posts and benefits in this country to such Americans as had studied in England preferably to others, and that the government should permit such youths to pass to Europe in the King's ships *gratis*. Dr. Fothergill thought that this would unite more firmly characters of the first order by their mixing with the British at the universities, and diffusing thus a spirit of inquiry after America, of which country the English were strangely ignorant, and thus cement friendships on both sides; and that this would be a more lasting benefit to each country than all the ships and armies that could be sent across the Atlantic. Few if any Englishmen was better acquainted with the American colonies than Dr. Fothergill.[3]

Thus Fothergill's political views, as well as family interest and his own benevolent temperament, led him to extend a generous patronage to his young American kinsman.

Dr. Fothergill sponsored Waterhouse's medical studies at Edinburgh, where he spent nine months, beginning in the fall of 1775, and at Leyden, where he matriculated in October, 1778. The years intervening between his return from Edinburgh and his departure for Leyden, and probably some of his Leyden vacations, were spent in London, his chief residence being Dr. Fothergill's house in Harpur Street, Bloomsbury.[4] Waterhouse gives a pleasant picture of his association with his patron:

> Dr. Fothergill practised forty years at the court end of London, was Physician to many of the nobility, and most of its old families, and occasionally was consulted by the first rank in the kingdom. His prudence and delicacy were equal to his wisdom; yet it would be difficult for an affable man to conceal entirely his opinion of the characters occupying different ranks in authority, from one who prudently sought information. Nearly every night, during three years, I, with my transcript Lectures and common-place book, sat at the same table with that industrious philanthropist, from eight o'clock to eleven, both of us exercising our pens in our own way. Had I possessed any of the *Boswellian* ambition, I had the best opportunity of compiling a *Fothergilliana* . . . .[5]

From this intimate association, Waterhouse undoubtedly profited greatly. In his writings he lets fall occasional crumbs of moral or medical

[3] *Essay on Junius*, pp. 245–246.

[4] In 1776, while "walking the hospitals," Waterhouse took quarters, apparently temporary, in Gracechurch Street (Dunlap *op. cit.*, I, 171). The Leyden vacations were chiefly spent in expeditions on the continent (see "Sketch of the Life of Benjamin Waterhouse, M. D.," by "R.," in *The Polyanthos*, May, 1806, p. 77); but we know that Waterhouse was in London in the summer of 1780 (*Essay on Junius*, p. 247).

[5] *Essay on Junius*, pp. xiii–xiv. Fothergill occasionally employed Waterhouse as his secretary, in transcribing for the press various essays on American affairs (*ibid.*, p. 246).

wisdom derived from his mentor. Inveighing against the pernicious effects of wine — its tendency to create a "deficiency of bile" — he adds: "My venerable preceptor, DR. FOTHERGILL cured such complaints with fresh made *porter*;" then, regretfully, "By the time London porter arrives in this country it contains too much vinegar to be serviceable in these cases."[6] And Waterhouse's *Essay Concerning Tussis Convulsiva, or, Whooping Cough* is not only full of respectful references to Fothergill, but is also dedicated to that physician:

THE AUTHOR DEDICATES THIS ESSAY . . . TO THE MEMORY OF DOCTOR JOHN FOTHERGILL, A MAN VERY LEARNED, WISE, AND PIOUS; WHO, DURING HALF A CENTURY, WAS REGARDED AS THE FIRST PHYSICIAN OF THE FIRST CITY IN THE WORLD: THE FOUNDER AND DIRECTOR OF HIS STUDIES; IN NAME, HIS PROAVUNCULUS, IN EFFECT, HIS FATHER.[7]

Waterhouse "attended . . . occasionally some of Fothergill's own practice," though not, it is to be presumed, such illustrious patients as the heads of the houses of Northumberland and Portland, or Lords Camden, Shelburne, and Mansfield.[8] These, however, his residence with Fothergill permitted him occasionally to see, together with the prominent men of science who frequented the house of the great doctor. It was here, no doubt, that Waterhouse met the philosopher, Joseph Priestley, of whom he later wrote: "I knew the man before he grew old and sour, if not acrid, the common case with organic bodies kept long in a hot place."[9]

Not in Harpur Street alone, but also at his Cheshire estate, Lea Hall, to which he retired for two months every autumn, Fothergill gathered about him the ablest physicians of the day. To this place, in the early fall of 1778, Dr. John Haygarth came from the nearby town of Chester to lay before Fothergill his plans for abolishing the small-pox from Great Britain by the use of general inoculation, carefully controlled. Waterhouse was then staying with Fothergill; to the several conferences which followed, he contributed information about the measures taken in Rhode Island to prevent the spread of small-pox. The same information, more fully expressed, he conveyed to Haygarth in a letter dated from Lea Hall, Sep-

[6] *Cautions to Young Persons Concerning Health*, Cambridge, Printed at the University Press by W. Hilliard, 1805, p. 21, n.

[7] Boston, Munroe and Francis, 1822. This essay contains (p. 140) another pleasant glimpse of Fothergill: "How often has that excellent physician remarked to me, while riding through the streets of London, and noticing the thin waistcoats of the young men passing on the sidewalks, which they very generally put on about *Easter* — 'now we shall have the annual *silk waistcoat* fever.' " Waterhouse also dedicated his Leyden dissertation to Fothergill.

[8] *Essay on Junius*, pp. v, xiv.

[9] Letter from Waterhouse to Jared Sparks, Cambridge, October 4, 1836; original in Harvard College Library.

tember 25, 1778. This letter was the first of a long correspondence, lasting over twenty years; in the course of that time Waterhouse, who at first opposed Haygarth's theory that the variolous infection was restricted to a narrow sphere, gradually became an advocate of the doctrine.[10]

It was John Haygarth who, in 1800, sent to Waterhouse the first sample of cow-pox virus.[11] The American doctor's earliest knowledge of Jenner's great discovery, however, came to him from another friend acquired in these London years. John Coakley Lettsom, indebted, like Waterhouse, to the patronage of Fothergill, was an established physician when Waterhouse arrived in London. Lettsom's practice, so pressing that it allowed him no holiday for nineteen years, probably prevented his seeing much of the young American student.[12] It is certain, however, that they met: Lettsom frequently visited Fothergill, and we have Waterhouse's own statement that Lettsom was among the persons he persuaded to sit for his friend Gilbert Stuart.[13] That their meeting led to friendship is sufficiently established by the cordial correspondence which they carried on for many years thereafter. Throughout the 1790's, Lettsom sent numerous gifts to Waterhouse, or to Harvard College through Waterhouse, including books, stuffed animals and birds, seeds, and a large collection of mineralogical specimens. And in November, 1798, Lettsom first informed Waterhouse of the discovery of small-pox vaccination, and sent him, early in 1799, a copy of the "golden treatise of Jenner."[14]

Lettsom was one of those who in 1774 joined with Dr. Hawes to form the Humane Society of London, established to disseminate knowledge concerning the means of resuscitating persons apparently drowned. Lettsom, or perhaps Hawes himself, may have imparted his enthusiasm to Waterhouse, who, in 1782, made an unsuccessful attempt to arouse interest in the formation of an American humane society, and who succeeded in starting such a movement in 1785 with the help of Dr. Henry Moyes of Edinburgh. The "recovery of persons drowned and seemingly dead" was a matter of general interest in that day, and Fothergill, as well as Cullen of

[10] For the material in this paragraph, see John Haygarth, *Medical Transactions*, London, Cadell and Davies, 1801, I, [193]–200; II, [1]–2; III, 259 ff., 319–320, 569.

[11] *Ibid.*, I, 211; Waterhouse, *A Prospect of Exterminating the Small Pox Part II*, Cambridge, Printed for the author by William Hilliard, 1802, p. [5].

[12] T. J. Pettigrew, *Memoirs of the Life and Writings of the Late John Coakley Lettsom*, London, Longman, 1817, II, 53; "R.," in the *Polyanthos* (May, 1806, p. 76), expresses surprise that there is no reference to Lettsom in the journal which Waterhouse kept throughout this period.

[13] Dunlap, *op. cit.*, I, 172; see also Pettigrew, *op. cit.*, II, 492.

[14] Waterhouse, *Prospect of Exterminating the Small Pox Part II*, p. 77.

Edinburgh and John Hunter, both of whom Waterhouse knew, published their opinions on the subject.

Natural history seems to have engrossed these eighteenth century physicians of Fothergill's circle as completely as subjects more directly in the way of their profession. Waterhouse was not slow in following suit, though his enthusiasm was kept within bounds:

> During the residence of several years in the family of the celebrated Dr. Fothergill in London, he acquired there a taste for the works of nature; but has endeavoured to follow the advice of his venerable kinsman, "never to suffer Natural History to supersede Medicine; but to regard it only as an agreeable adjunct to the healing art."[15]

Fothergill's own particular love was botany. He planted a large botanical garden at Upton near Stratford in 1762, and a smaller one at his Cheshire estate. Waterhouse visited both these places and wrote an effusive description of the former:

> We shall close . . . with an account of the botanical garden reared by that celebrated physician and naturalist, Dr. FOTHERGILL, at the village of Upton, six miles from the royal exchange, London. The wall of this garden enclosed above five acres of land; a piece of water, a winding canal forming it into two divisions. A glass door from the winter parlour gave entrance to a long range of hot and green-house apartments, of nearly two hundred feet extent, containing upward of three thousand four hundred distinct species of exotics whose foliage wore a perpetual verdure, and formed a beautiful and striking contrast in the winter to the shrivelled natives in the cold, open air. In the open ground, with the returning spring, about three thousand distinct species of plants and shrubs vied in verdure with the natives of Asia and Africa. It was in this spot, where a perpetual spring was realized, that the elegant proprietor sometimes retired to contemplate the vegetable productions of the four quarters of the globe united within his domain, where the spheres seemed transported, and the arctic circle joined to the equator. (pp. 114–115)

In these surroundings the beauty of the night-blowing cereus played upon the "delicate susceptibility" of Waterhouse's youthful nerves:

> The first time the *Botanist* gazed at this transitory beauty, in the garden of *Fothergill*, and saw its sudden change, it was with sensations he never can forget. He confesses that in the vast assemblage of flowers that adorn the earth, this flaunting beauty caught his eye, and excited strongly his youthful admiration. (p. 226)

[15] Waterhouse, *The Botanist*, Boston, Joseph T. Buckingham, 1811, p. xiv. The page numbers given in the following paragraphs refer to this work.

Through Fothergill, Waterhouse became acquainted with one of the rising botanists of the day, William Curtis, "under whose tuition he herbarized in the environs of London two years in succession" (p. 112, n.). Curtis was at that time and until his death lecturer and demonstrator in the Physic Garden at Chelsea, which was supplied with plants by the regular excursions of a society of London apothecaries. He neglected his own lucrative practice as an apothecary to devote his time to botanizing and, in 1777, to the publication of an elaborately illustrated account of all the plants in or about London, his *Flora Londinensis*. Fothergill at this point withdrew his patronage from Curtis rather than encourage him in what the physician believed to be an extravagant proceeding (pp. 134–135), but Dr. Lettsom gave regular and generous aid to Curtis.[16] As each new and splendid number of the *Flora Londinensis* appeared, Fothergill woefully predicted to Waterhouse that the expense of the work would result in the ruin of its author. The error of these prophecies Waterhouse later recorded:

> . . . Fothergill, though possessed of the "*perspicax oculus*" in a preeminent degree, did not then see, that the mild and silent Curtis was imbued with the persevering spirit of Linnaeus. He little thought, that this meek and quiet man would finally effect all that he meditated; and that to the *Flora Londinensis* he would add the *Monthly Botanic Magazine*, and to both a *Botanic Garden!* . . . Under a mild and playful disposition, William Curtis was animated with a persevering spirit, that, in a different walk of life, might have wearied out the patience of a Xenophon, and discouraged Hannibal himself. (p. 135)

Waterhouse goes on to describe in much detail, and as if he had seen it, the botanical garden of Curtis at Brompton; this garden, however, was not planted until after the departure of Waterhouse for America. Other botanical acquaintances whom Waterhouse may have met at the house of Fothergill were Sir Joseph Banks and Dr. Daniel Solander, who had carried their botanizing as far afield as Iceland and the South Sea Islands. Botany was the subject principally dealt with in the natural history lectures which Waterhouse later gave in America; a series of these was published in the *Monthly Anthology* (1804–1808), and in book form in 1811 (see Fig. 2).

Experimental philosophy, in which he attended the lectures of James Ferguson, and mineralogy also occupied Waterhouse, at least briefly, in London. His introduction to the latter subject came through the lectures of the eccentric Emanuel Mendes Da Costa, who was assisted by Fothergill throughout these years.[17] Waterhouse evidently had little lasting profit

[16] Pettigrew, *op. cit.*, I, 162.

[17] *Polyanthos*, May, 1806, p. 76; R. Hingston Fox, *Dr. John Fothergill and His Friends*, London, Macmillan, 1919, pp. 212–213. Ferguson died in 1776; Waterhouse probably heard a few of his lectures in the summer of 1775.

from Da Costa's instruction, for on undertaking the care of the mineralogical collection given to Harvard by Dr. Lettsom he admitted that he "was less acquainted with that department of natural history than perhaps any other" and had undertaken a course of reading on the subject.[18] Certainly no enthusiasm for mineralogy, but rather a hint of the reverse, appears in the phrases with which he presented natural history to the medical students of Harvard:

> Natural History is not introduced here barely to amuse, but with a hope that by cultivating a taste for the works of nature some solid advantage may arise. The American may possibly be reminded, in his researches, that while factitious wealth is dug up from the bowels of the earth, *our* only true and solid riches must be drawn from its *upper stratum*, from thence man receives a reward of his honest industry by a kind of perpetual miracle wrought in his favour.[19]

As has been observed, Waterhouse paid due heed to Fothergill's injunction that he not allow natural history to cause him to stray from the prosecution of his medical studies. In London, he walked the hospitals — Guy's and St. Thomas's, he assisted Fothergill in his practice, he diligently attended medical lectures. On Monday, Wednesday, and Friday evenings, from seven to eight, October through April of each year, the renowned John Hunter gave "at No. 28, in the Hay-market, a Course of Lectures on the Principles and Practice of SURGERY," in which he introduced "so much of the ANIMAL OECONOMY as may be necessary to illustrate the Principles of those Diseases which are the Object of Surgery."[20] Honorarium, four guineas the course. No enterprising student would neglect such an opportunity, and Waterhouse duly presented himself at the feet of the "prince of physiologists," to whom, as he later wrote, he owed "more, than to any public medical teachers he ever heard."[21] Maxims culled from the Hunter lectures crop up in Waterhouse's *Essay Concerning Tussis Convulsiva:* "John Hunter used to tell us, that a very severe blow on the pit of the stomach, killed the *whole man*, so instantly and outright, that the muscles had not time to become rigid" (p. 54). And further on:

> The celebrated John Hunter, was indeed great in every department of our art: a physician, in the original sense of the word, a great anatomist, and a complete surgeon. I have often heard him remark, that excessive purging of children, was a baneful source of that derangement of the lymphatic absorbent system, which

[18] Letter from Waterhouse to Lettsom, Cambridge, October 18, 1799; quoted by Pettigrew, *op. cit.*, II, 466.

[19] *A Synopsis of a Course of Lectures, on the Theory and Practice of Medicine, Part the First*, Boston, Printed by Adams and Nourse, 1786, p. vi.

[20] Stephen Paget, *John Hunter: Man of Science and Surgeon, (1728–1793)*, New York, Longmans, Green & Co., 1897, p. 102.

[21] *Prospect of Exterminating the Small Pox Part II*, p. 90, n.

leads directly to scrophula; which leads indirectly to consumption. His sagacity here coincided with the opinion of an author, he, most probably, never read; I mean the learned Gaubius . . . . (p. 82).

There are indications that Waterhouse's acquaintanceship with Hunter progressed beyond the mere attendance at the lectures. "John Hunter," Waterhouse writes, "once told me that 'he loved to be puzzled, for then he was sure he should learn something valuable.' "[22] In a letter to Dr. Samuel L. Mitchill, written in 1825, Waterhouse compares the characters of "John Hunter, whom I knew well" and Samuel Thomson, the discoverer of lobelia.[23] Hunter's dissecting room at his house on Jermyn Street was open to those who attended the course of lectures, and it is probable that Waterhouse there improved the acquaintanceship; Hunter's immense collection of pathological and anatomical specimens, which overflowed the house, must have attracted the young student as much as the demonstrations in the dissecting room. Edward Jenner, once Hunter's house-pupil, was practising surgery in Gloucestershire during Waterhouse's stay in London, and Waterhouse, later to become Jenner's chief disciple in America, neither met him in England "nor heard his name."[24]

In his *Essay Concerning Tussis Convulsiva*, Waterhouse pairs the name of John Hunter with that of another Scot:

I first learnt the great importance of the mucous membrane from the prælections of Drs. George Fordyce, and John Hunter, men who reflected honour upon Great Britain. From Fordyce's "*symptoms of irritation*," and from Hunter's inflamed mucous membrane, "*teazing the constitution into an hectic*," I discovered the first glimmering of that light, which is now penetrating the dark recesses of the animal economy. (p. 36)

George Fordyce, "a philosophical physician much admired by his pupils," had the honor of Waterhouse's attendance at his medical and chemical lectures in Essex Street every morning "during between two and three years."[25] Fordyce lectured from seven to ten, six mornings a week the whole year through, on chemistry, materia medica, and the practice of physic. Waterhouse took careful notes, which he later had "fairly transcribed and bound up."[26] He found them of service, no doubt, when he became Harvard's first Professor of the Theory and Practice of Physic.

[22] Letter from Waterhouse to Edward Jenner, Cambridge, April 24, 1801; quoted by John Baron, *Life of Edward Jenner, M.D.*, London, Henry Colburn, 1838, I, 440.

[23] See "Life and Medical Studies of Samuel Thomson," *Bulletin of the Lloyd Library of Botany, Pharmacy and Materia Medica*, No. 11 (1909), p. 61.

[24] Waterhouse, *Essay on Junius*, p. x.

[25] Dunlap, *op. cit.*, I, 172.

[26] Waterhouse, autograph document, dated February 24, 1812; original in the Harvard College Library.

Waterhouse's admiration for Fordyce was such that he proposed to his fellow-students that they subscribe a half-guinea each to have a portrait of Fordyce made by Gilbert Stuart. They readily complied; Waterhouse collected the money, passed it on to Stuart, then worried himself into a serious illness in trying to persuade Stuart to begin the painting. The half-guineas were finally refunded by Dr. Fothergill.[27]

This episode was only one of many connected with Gilbert Stuart that served to enliven Waterhouse's London life. The two had been boyhood friends in Newport. Stuart arrived in London in November, 1775, after Waterhouse had left for Edinburgh. When Waterhouse returned, in the summer of 1776, he found Stuart "in lodgings in York-buildings, with but one picture on his easel." Waterhouse took measures to procure the impoverished painter quarters "between the houses" of two of Fothergill's nieces, and to secure commissions for him. Fothergill obligingly ordered a portrait of Waterhouse; Lettsom and William Curtis sat for portraits, "and so did two beautiful young ladies, sisters; one with dark hair as the tragic muse, the other with reddish hair and light blue eyes, as the comic muse" (I, 172). Nevertheless, Stuart obstinately remained impoverished, levying on Waterhouse's pocket-money, and occasionally being rescued from sponging-houses by his friend. Such behavior was naturally irritating:

> With Stuart it was either high tide or low tide. In London he would sometimes lay a bed for weeks, waiting for the tide to lead him on to fortune . . . . There was a caprice in Mr. Stuart's character as provoking to his best friends and nearest connexions, as it was unaccountable to the public. (I, 167)

On the other hand, a reproach may perhaps be laid at Waterhouse's own door. Shortly after his arrival in London in 1775, he had become acquainted with the famous American painter, Benjamin West, then historical painter to the king. Stuart came to London with the express purpose of becoming West's pupil, but Waterhouse evidently made no effort to introduce him to West until 1778, by which time Stuart had conquered his own diffidence sufficiently to seek other means of securing the introduction (I, 173–174).[28]

Despite these difficulties, the two young Americans seem to have enjoyed a constant companionship. Waterhouse writes:

> Stuart and I agreed to devote one day in the week to viewing pictures, wherever we could get admittance. We used Maitland's description of London for a guide.

[27] This anecdote and the following account of the Stuart-Waterhouse friendship are draw from Waterhouse's own statements, quoted by Dunlap, *op. cit.*, I, 162 ff.

[28] [Jane Stuart] "The Youth of Gilbert Stuart," *Scribner's Monthly*, XIII (1877), 642.

We found nothing equal to the collection at the Queen's Palace or Buckingham House. We made it a point also to walk, together through all the narrow lanes of London, and having a pocket map, we marked such streets and lanes as we passed through with a red lead pencil, and our map was full two thirds streaked over with red when we received some solemn cautions and advice to desist from our too curious rambles. We were told by some who knew better than we did, that we run a risk of bodily injury, or the loss of our hats and watches, if not our lives, when we gave up the project. We had, however, pursued it once a week for more than two years, and never experienced other than verbal abuse, chiefly from women, and saw a great deal of that dirty, monstrous, overgrown city, containing to appearance, no other people than the natives of Britain and Ireland, and a few Jews, not laughing and humming a song like the populace of Paris, but, wearing a stern, anxious, discontented phiz. (I, 173)

The two enjoyed numerous conversations — on anatomy and botany, no doubt, as well as music and painting, for Waterhouse testifies to the tact with which Stuart adapted his talk to the company in which he found himself. They had painting sessions, Waterhouse serving as model: the Stuart portrait of Waterhouse, now in the Redwood Library at Newport (see Fig. 3), is perhaps one of the results of these sittings; Waterhouse's description of another is sufficiently delightful to make us sincerely regret its loss:

I once prevailed on [Stuart] to try his pencil on a canvass of a three-quarter size, representing me with both hands clasping my right knee, thrown over my left one, and looking steadfastly on a human skull placed on a polished mahogany table. (I, 174)

In 1778, shortly before Waterhouse's departure for Leyden, Stuart painted a self-portrait, which he gave to his friend; it was hanging in Waterhouse's Cambridge home when Stuart visited him there in 1805, and the artist was gratified to find his early work so creditable.

A loyal American living in England while his country was rebelling against British dominion, Waterhouse had occasion for much anxiety: "Medicine and Politics were mixed together in a young, ardent, and anxious brain, far distant from his suffering country!"[29] In his patron's home, he was sure of sympathy in his concern about American affairs. Fothergill and many of his associates, though loyal Englishmen, saw the justice of the American cause. Only a month before Waterhouse reached London, Fothergill was collaborating with Benjamin Franklin and David Barclay in an effort to avert hostilities. In his patron's home, also, Waterhouse was in the way of receiving early information on each new develop-

[29] *Essay on Junius*, p. viii.

ment; thus, in 1776, he was introduced to Thomas Paine's *Common Sense* shortly after its appearance:

> [Fothergill] was family-physician to most of the old nobility, as well as many of the new, and was occasionally called into consultation at the bed-side of the highest in rank and station; by which he had an opportunity of knowing the sentiments of the *prime*, as well as the secondary movers of the political machine, — its wheels as well as its leaden weights. I well remember *Lord Shelburne* calling at Dr. Fothergill's, and leaving a copy of "*Common Sense*," at its very first appearance in London. For several days the good Doctor appeared taciturn and abstracted. Within a week perhaps, he gave me the pamphlet to read, charging me to let no one see it. I read it as a Spaniard or Portuguese would read an interdicted book in the vicinity of the inquisition. It gave to my thoughts a new direction, and occupied my mind day and night. It raised in me a new train of prospective ideas,—glorious ones, be sure, yet dreadful, — "the battle of the warrior, with confused noise, and garments rolled in blood!"[30]

This infection with Paine's ideas gave way to a tremendous enthusiasm for the letters of Junius, an enthusiasm which remained with Waterhouse for many years; he later attempted to prove the identity of this mysterious writer with the great Lord Chatham (see Fig. 4). Another public figure who attracted the notice of Waterhouse was the celebrated John Wilkes, who on the tenth of April, 1775, presented to George III a remonstrance against the government's adoption of a coercive policy toward the American colonies. Waterhouse reached London probably only a few days after this occurrence; he visited Wilkes shortly thereafter:

> I had some personal knowledge of this champion of the people's rights, having had letters of introduction to him in the year 1775, when he was Lord Mayor of London. I went directly from Dr. Fothergill's in Harpur Street to wait on his Lordship at the City Mansion-House. What a contrast, — the *simplex munditiis* of the one, and the *peacockism* of the other![31]

Waterhouse did not meet Benjamin Franklin, the friend of Fothergill, in London, since Franklin left England on March 25, 1775. This must have been a grave disappointment, for we have Waterhouse's assurance that he had venerated Franklin's name since boyhood: "of great men, he was the one I wished most to see." During his Leyden period, however, he met Franklin in France:

[30] *Ibid.*, pp. 246–247. Waterhouse here and elsewhere (*ibid.*, p. 245; letter to Jared Sparks, June 6, 1833, in Harvard College Library) writes that Fothergill told him that Franklin was responsible for the foundation and framework of this essay, while Paine "finished it in his strong and peculiar manner."

[31] *Essay on Junius*, p. 66. Waterhouse describes Wilkes' character as a combination of of the Roman Regulus with Richardson's Lovelace.

never was I so much captivated by the company and conversation of any old man. His wisdom and his wit were so happily blended as to prove that they spring from the same root, provided they are nourished by a soil of good humor.[32]

Though Waterhouse's republican views thus received sympathy in the circle of Fothergill, he found another state of affairs in the streets of London. There he heard his countrymen maligned with "virulent language" and in an "illiberal, anti-Christian style." This was in the spring of 1777, "when Burgoyne's fine army was about embarking for America, in the highest flow of spirits and the utmost glee, like a hunting party with the best omens of a fine chase!"[33]

I remember that new maps of its route, just from the press, were as plenty in London, in the hands of American refugees, as pamphlets. They [the army] talked of little else than driving all before them triumphantly from the Lakes to Boston. But, ere the equinoctial season was passed, that well-appointed army laid down their arms at Saratoga . . . .[34]

In the streets of London, Waterhouse saw hundreds of miserable refugees from America, all bitterly complaining against the rebels. Two such Tories Waterhouse knew from Newport days — an English comedian named Simpson, who had practised law in Newport for some years after being rescued from a ship which caught fire in the harbor, and his wife. The couple often visited Waterhouse at Fothergill's house and were sympathetically received:

I forgot their faults when I felt for their sufferings. I cautioned them emphatically not to cast any harsh reflections on the Americans, or their Congress in the hearing of any one of that house, and they followed my advice. Had he not taken it I would have reminded him that he was an English brand snatched out of the fire, by a people who drove him from their land for his ingratitude.[35]

In the latter part of the year 1778, Dr. Fothergill sent Waterhouse to Leyden "to acquire, as he smilingly said, a little of the Dutch phlegm."[36] John Adams has provided us with a brief description of Waterhouse as he was during the Leyden years:

Dr. Waterhouse . . . had resided three or four years, and taken the degree of Dr. in medicine, in the university of Leyden, where I first became acquainted with him. During part of the time of my residence in Leyden, I found Waterhouse and my two sons boarded in the same house. I took apartments in it, and finding him,

[32] Letter from Waterhouse to Jared Sparks, Cambridge, June 6, 1833; original in Harvard College Library.

[33] *Essay on Junius*, p. 390.

[34] *Ibid.*, pp. 357–358.

[35] Letter from Waterhouse to the Reverend Romeo Elton, January 25, 1840; original in the New York Academy of Medicine.

[36] *Essay on Junius*, p. vi.

though a sprightly genius, very studious and inquisitive, as well as sociable, I had no inquiries to make, but whether his moral character was good, and whether he was a loyal American. As to his morals, I could hear of no reproach or suspicion; as to his politics, though he came over from England, he came from the guardianship and pupilage of Dr. Fothergill, who was as good a friend to America, as any loyal Englishman could be. He had inscribed himself on the records of matriculation in the university of Leyden, Liberæ Reipublicæ Americanæ Federatæ Civis, and his conversation was in the style of a good American.[37]

This sketch would probably serve equally well for the Benjamin Waterhouse who, in June, 1782, returned to his native Newport. The sprightliness had perhaps been alloyed with a trifle too much of the "Dutch phlegm" prescribed by Fothergill, for certainly his sense of humor suffered in later years; the inquisitiveness, despite Leyden studies in law and history, as well as medicine, continued unabated. Waterhouse was still an enthusiast when he took up his American career, an enthusiast in his own studies and projects, and a man who expected equal zeal from others. In Fothergill's house, the hub of scientific London, he had seen how enlightened men brought their energies to bear on the problems of science and society. He returned to America prepared to do likewise. On the thirteenth of July, 1782, the very summer of his return, seven people drowned in Newport harbor when a pleasure boat upset. Waterhouse, with his knowledge of London's Humane Society and of similar organizations on the continent, published an account of their methods in the *Newport Mercury*.[38] He attempted to arouse interest in the formation of a Rhode Island humane society; the attempt failed.

In 1783, the Harvard Medical School opened, and Waterhouse was appointed its first Professor of the Theory and Practice of Physic. His hopes and energies ran high; in a paper which he read before the American Academy of Arts and Sciences in this year, he proposed that the physicians of America collaborate in preparing a history of epidemic diseases, rivalling the great accomplishment of Sydenham:

In laudable exertions shall Englishmen go beyond us?

. . . . . .

Times as well as Countries have their wastes and desarts. What period so proper as this, for cultivation — the dawn of peace? — We want the *will* more than the *ability* for investigating the more abstruse parts of nature; and I am persuaded that it is in Phylosophy as in Politics, that mens ambitions are generally

[37] *Correspondence of the late President Adams*, Boston, Everett and Munroe, 1809–[1810], p. 572.

[38] See the preface to Waterhouse's discourse, "The Principle of Vitality," in *The Botanist*, p. [233]; *Newport Mercury*, July 20, 1782.

proportioned to their capacities, for Providence seldom sends a man into the world with the inclination to attempt great things who has not abilities equal to their performance.[39]

He pointed out that the European world was watching the development of American civilization. West and Copley had shown what American genius could do in art. In science, however, achievement depended not so much upon individual genius as upon the united efforts of many men. To this earnest plea for collaboration, Waterhouse apparently received no adequate response. His failure to arouse American men of science to concerted effort under his leadership was not due entirely to the state of apathy existing among his colleagues. Politics, religion, personal animosities, and jealousy perhaps played a larger part than has been brought out heretofore, but this complicated period of Waterhouse's life must await future consideration.

The knowledge of natural history which Waterhouse acquired in London, he revived for lectures at Brown University in 1786 and 1787, and for similar lectures thereafter at Harvard. His efforts seem to have received neither true appreciation nor adequate remuneration. He conducted an extensive correspondence with his English friends, who generously advised him and supplied him with books and specimens; the specimens apparently got in the way of his fellow professors, and petty differences arose. Remembering Fothergill's garden at Upton and the teachings of Curtis, he proposed to plant a botanical garden at Cambridge, but was discouraged by the prevailing indifference to his plan.

All of these projects took time and effort; no one of them was received with the appreciation that Waterhouse probably felt they deserved, or with the enthusiasm they might have met, say, in London circles. And his practice, too, was a disappointment. He could remember Fothergill, the fortunate physician, consorting with the highest of the nobility and the greatest of the scientists in England. This was what a physician should be — a man of dignity and learning, whose position was secure, whose opinions on political and economic questions, as well as medical matters, were respectfully received, a man sufficiently well paid to take time from his practice for literary projects. In America, however, a physician was something quite different, as Waterhouse informed Dr. Lettsom in 1794:

Should I ever execute what I am constantly revolving in my mind, "A View of Society and Manners, with the Natural History of New England," I should send it to England, and publish it there without a name. The fact is, I have no taste for

[39] *Of Epidemic Diseases*, Cambridge, Harvard University Press, 1942, pp. 5, 7.

the practice of physic as it is conducted in this country. It is not worth a man's attention. I feel such a mighty difference between transcribing from the great volume of Nature, and practising among the very vulgar, that is, conforming to the whims and nonsense of old women and silly people, that I am sometimes almost determined to renounce it for ever. I know how a London physician gets his bread, but with us it is widely different: a man like me of a weakly frame, addicted to study, is liable to be called out five or six miles on horseback in a severe winter night, and to remain out all night, and to receive (in the course of a year) a guinea for it! We are obliged to be physician, surgeon, apothecary, and tooth-drawer, all under one; and if we are not attentive to small things, and if we do not give consequence to trifles, we are dropped for some one who does. You are spoiled (say some of my friends) for practice in this country, by living so much with Dr. Fothergill, which is in a great measure true — a charming specimen of my intended view of society and manners![40]

By 1801, the early enthusiasm which had seen America as virgin soil whence energy and enthusiasm might reap great harvests, had sadly waned. Waterhouse wrote to young Mathias Spalding, his erstwhile pupil, then in England: " . . . I rejoice as often as I call to mind the fortunate incidents that have combined to place you in the high road of improvement you are now in. You will learn more in one week in London, than in America during twenty."[41] And in the same year he had occasion to complain to Jenner of lack of cooperation from even the most enlightened of his countrymen:

The characters in America most distinguished for wisdom and goodness are firm believers in your doctrine. They are not, however, over-forward in assisting me against this new irruption of the Goths. I do not wish them to do more than make cartridges, or at least hand them. At present they leave me too much alone, and it is probable will only come to my assistance when I do not *want* them. Had I not a kind of apostolic zeal I should at times feel a little discouraged. The natives of America are skilful in bush-fighting.[42]

As affairs in Cambridge went steadily against him, these complaints continued. In 1810, he described his misfortunes to Lettsom, and added:

Were I a single man, and without children, I would go to England; if not to live there, at least to die there. You do not knock a man on the head in Britain because he exerts himself more than his neighbors do.[43]

And in the *Essay Concerning Tussis Convulsiva* (1822), which contains so

[40] Waterhouse to Lettsom, Cambridge, November 25, 1794; quoted in Pettigrew, *op. cit.*, II, 464–465.

[41] Letter from Waterhouse to Mathias Spalding, Cambridge, October 20, 1801; original in the author's collection.

[42] Waterhouse to Jenner, Cambridge, November 5, 1801; quoted in Baron, *op. cit.*, I, 473.

[43] Waterhouse to Lettsom, Cambridge, May 8, 1810; quoted in Pettigrew, *op. cit.*, II, 485.

many references to the London physicians Waterhouse had known, London is described as "the first city in the world, where physic, including surgery, is more cultivated, and more honored, and better rewarded than in any other city that is, or ever was" (pp. xiii–xiv, n.).

Lest it be supposed that Waterhouse unduly exaggerated the difficulties of his position, the evidence of another, more distinguished, American physician may be presented. In 1786, Benjamin Rush, who also had known London and the circle of Fothergill, wrote to Dr. Lettsom:

> You have suggested a number of excellent hints for the improvement and extension of knowledge in America. But, my friend, who shall undertake to carry such hints into execution? Philosophy does not here, as in England, walk abroad in silver slippers; the physicians (who are the most general repositories of science) are chained down by the drudgery of their professions; so as to be precluded from exploring our woods and mountains. Besides, there are not men of learning enough in America as yet, to furnish the stimulus of literary fame to difficult and laborious literary pursuits. I have felt the force of this passion; Alas! my friend, I have found it in our country to be nothing but "avarice of air."[44]

By virtue of his long period of arduous study abroad, Waterhouse was able to place before his students at Harvard the choicest medical knowledge of Europe, and to point their way in paths of study outside the province of medicine. He was prepared to devote himself completely to the academic life, but his professor's salary was inadequate; to live he had to practice, and practice for the American physician of those times was drudgery. With drudgery he could not be content: he had lived too long in the house of Fothergill, and knew too well how a physician should live. This brief review of Waterhouse's London years leads us to the conclusion that his experiences abroad incapacitated him, in a sense, for the life he had to lead at home.

[44] Rush to Lettsom, Philadelphia, October 26, 1786; quoted in Pettigrew, *op. cit.*, II, 428.

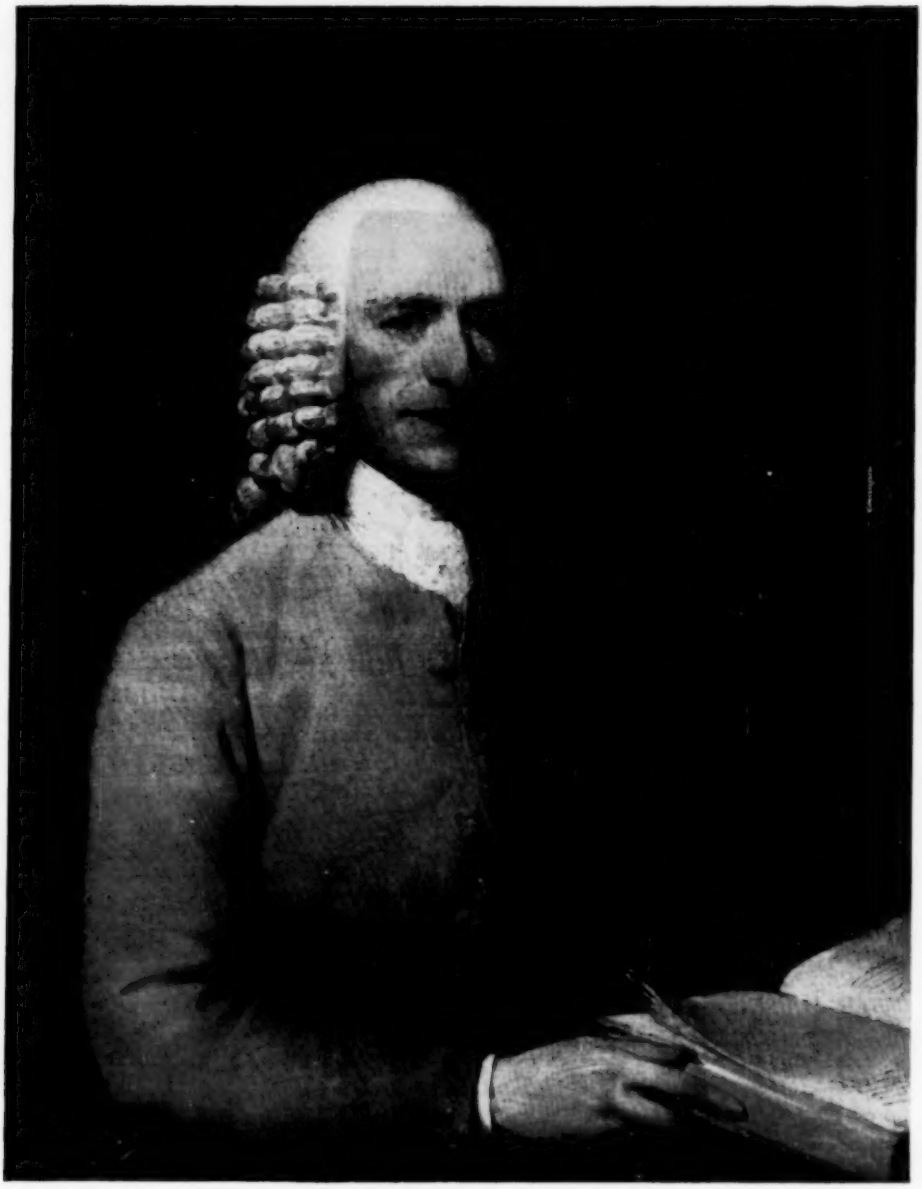

FIG. 1. Dr. John Fothergill, painted from memory after his death by Gilbert Stuart. This portrait is reproduced through the courtesy of The Pennsylvania Academy of the Fine Arts.

THE

BOTANIST.

BEING

THE BOTANICAL PART

OF A

COURSE OF LECTURES

ON

NATURAL HISTORY,

DELIVERED IN THE UNIVERSITY AT CAMBRIDGE.

TOGETHER WITH A

DISCOURSE

ON

THE PRINCIPLE OF VITALITY.

BY BENJAMIN WATERHOUSE, M. D.

Fellow of the American Academy of Arts and Sciences;—of the Philosophical Society of Philadelphia; and of Bath: and of Manchester in England; Fellow of the Medical Society, London;—of the Academy of Arts and Sciences, Belles Lettres, Inscriptions, and Commerce, Marseilles; and of the National Medical School of France: and Professor of the Theory and Practice of Physic in the University of Cambridge, Massachusetts.

BOSTON:

PUBLISHED BY JOSEPH T. BUCKINGHAM,
WINTER-STREET.

1811.

FIG. 2. The title page of Waterhouse's *The Botanist*, Boston, 1811. The series of essays assembled in this volume first appeared in the Boston *Monthly Anthology*, 1804–1808.

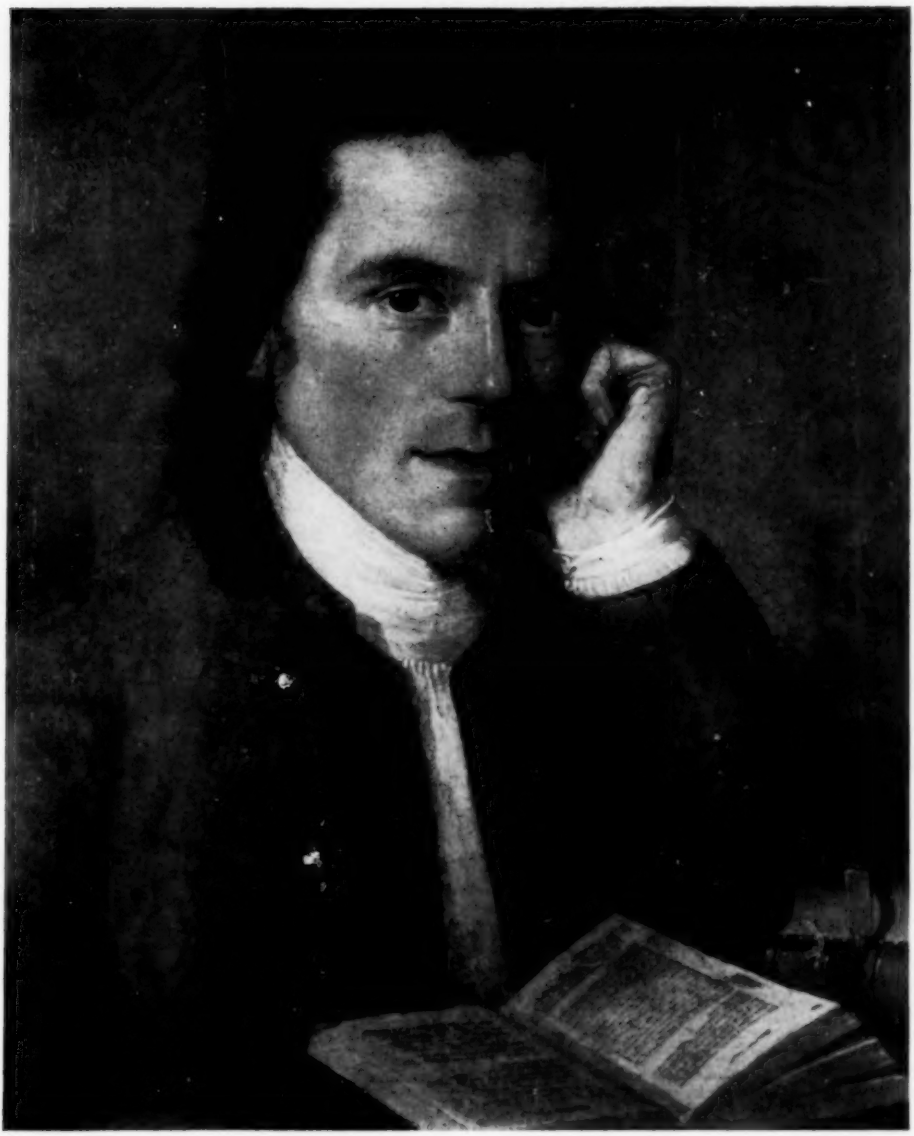

FIG. 3. Benjamin Waterhouse, painted by Gilbert Stuart, perhaps in London in 1776. This portrait is reproduced with the permission of the Redwood Library and Athenæum, Newport, Rhode Island, and through the courtesy of the Frick Art Reference Library, New York City.

AN ESSAY

ON

JUNIUS AND HIS LETTERS;

EMBRACING

A SKETCH OF THE LIFE AND CHARACTER OF

WILLIAM PITT, EARL OF CHATHAM,

AND MEMOIRS OF CERTAIN OTHER DISTINGUISHED INDIVIDUALS;

WITH

REFLECTIONS HISTORICAL, PERSONAL, AND POLITICAL,
RELATING TO THE AFFAIRS OF GREAT BRITAIN AND AMERICA,
FROM 1763 TO 1785.

BY BENJAMIN WATERHOUSE, M. D.,

MEMBER OF SEVERAL MEDICAL, PHILOSOPHICAL, AND LITERARY SOCIETIES
IN EUROPE AND AMERICA.

As to the Book itself, it can say this in its behalf, that it does not merely confine itself to what its title promises, but expatiates freely into whatever is collateral.
Harris's Hermes.

BOSTON:
GRAY AND BOWEN.
1831.

FIG. 4. The title page of the *Essay on Junius*. This work, the chief literary effort of Waterhouse, grew out of the political interests of his London years.

A Note on William Blake and John Hunter

JANE M. OPPENHEIMER*

WILLIAM BLAKE resisted the restrictions of contemporary thought as only genius can; and his darkly brilliant and erratic mind must therefore remain, for longer than we care to contemplate, an enigma defying analysis by the usual methods of intellectual history. Yet even Blake, on occasion, betrayed himself as receptive to influence by the spirit of his times. Because of his very independence, we are the more grateful for any slight insight we may attain into his relationships with the minds of his contemporaries.

Blake's preoccupation with anatomy, and his ability to transfigure it both by written word and graven line, are among his most outstanding traits, and it has been one of the glories of literature and of art that to him

> . . . every Generated Body in its inward form
> Is a garden of delight & a building of magnificence.[1]

For intellectual history it becomes also good fortune, since we are thereby enabled to inquire into the scientific sources upon which he drew for the raw data which he was to convert to poetry.

For, mystic though he was, Blake spoke in the words and the imagery not only of nature but of natural science itself:

> Each outcry of the hunted Hare
> A fibre from the Brain does tear;[2]

> The Microscope knows not of this nor the Telescope: they alter
> The ratio of the Spectator's Organs, but leave Objects untouch'd.
> For every Space larger than a red Globule of Man's blood
> Is visionary;[3]

> . . . every Moment has a Couch of gold for soft repose,
> (A Moment equals a pulsation of the artery);[4]

> In gnawing pain drawn out by her lov'd fingers, every nerve

* Department of Biology, Bryn Mawr College.

[1] Blake, *Poetry and prose*, p. 515.

[2] *Ibid.*, p. 118.

[3] *Ibid.*, p. 522.

[4] *Ibid.*, p. 521.

She counted, every vein & lacteal, threading them among
Her woof of terror.[5]

The common man might well count nerves and veins, but the poet who numbers the lacteals is conversant with the technical language of anatomy. Nor can it be pure coincidence that Blake echoed the anatomical nomenclature for the cochlea and the labyrinths and the petrous bone when he described the ear as "a little shell"[6] and wrote of its "labyrinthine intricacy"[7] and specified how in development

Two Ears in close volutions
From beneath his orbs of vision
Shot spiring out and petrified
As they grew.[8]

Surely it was from the professional anatomists, as well as from the Swedenborgians, that Blake drew his consciousness of the dynamics of organic function. But who of these could have whispered into his sensitive ear? For the clue we may turn to his own sparse records.

"I only wish Jack Tearguts had had the cutting of Plutarch," he had Sipsop say in *An island in the moon.* "He understands Anatomy better than any of the Ancients. He'll plunge his knife up to the hilt in a single drive, and thrust his fist in, and all in the space of a Quarter of an hour. He does not mind their crying, tho' they cry ever so. He'll swear at them & keep them down with his fist, & tell them that he'll scrape their bones if they don't lay still & be quiet. What the devil should the people in the hospital that have it done for nothing make such a piece of work for?"

"Hang that," said Suction; "Let us have a song." Then the Cynic sang —

1.

When old corruption first begun,
  Adorn'd in yellow vest,
He committed on flesh a whoredom —
  O, what a wicked beast!

2.

From then a callow babe did spring,
  And old corruption smil'd
To think his race should never end,
  For now he had a child.

[5] *Ibid.*, pp. 280–81.
[6] *Ibid.*, p. 643.
[7] *Ibid.*, p. 720.
[8] *Ibid.*, p. 250.

3.

He call'd him surgery, & fed
The babe with his own milk,
For flesh & he could ne'er agree,
She would not let him suck.

4.

And this he always kept in mind,
And form'd a crooked knife,
And ran about with bloody hands
To seek his mother's life.

5.

And as he ran to seek his mother
He met with a dead woman,
He fell in love & married her,
A deed which is not common.

6.

She soon grew pregnant & brought forth
Scurvy & spott'd fever.
The father grin'd & skipt about,
And said, "I'm made for ever!"

7.

"For now I have procur'd these imps
I'll try experiments."
With that he tied poor scurvy down
& stopt up all its vents.

8.

And when the child began to swell,
He shouted out aloud,
"I've found the dropsy out, & soon
Shall do the world more good."

9.

He took up fever by the neck
And cut out all its spots,
And thro' the holes which he had made
He first discover'd guts.[9]

There is more than a little evidence that this scathing and obscene indictment of experimental and scientific surgery was directed by Blake towards

[9] *Ibid.*, pp. 873–74.

a specific individual. *An island in the moon*, written around 1787, is said to have been intended as a satire on the "dull and pedantic talk at Mr. Mathew's,"[10] small gratitude for the fact that Mr. and Mrs. Mathew, together with Flaxman, were among Blake's earliest partisans. Some, but not all, of the characters have been identified,[11] Sipsop, for instance, as Thomas Taylor, who translated Plotinus and Porphyry, Inflammable Gas as Joseph Priestley, Quid the Cynic as Blake himself.

Who can Jack Tearguts have been, in the 1780's, but Jack Hunter, who founded experimental surgery? Hunter must have been himself well-known at the Mathews'. Mathew was afternoon preacher at St.-Martin's-in-the-Fields, in the parish where the Hunters lived. Mrs. Mathew was a literary hostess whose popular assemblies were attended by at least two of Mrs. John Hunter's good friends, Mrs. Carter[12] and Mrs. Montagu,[13] if not by Mrs. Hunter herself. The Mathews' son was described by John Thomas Smith,[14] another frequenter of their home, as "John Hunter's favourite pupil."[15] And what other Jack, then in London, who practiced surgery, could claim like Jack Hunter to "understand Anatomy better than any of the Ancients," and followed so characteristically the precept "Why think? why not try the experiment?"[16]

Indeed, if not at the Mathews', it may have been even among men of his own métier that Blake came to know Hunter or to know of him. "What is Call'd the English Style of Engraving," said Blake, "such as proceeded from the Toilettes of Woolett & Strange . . . can never produce Character & Expression. I knew the Men intimately, from their Intimacy with Basire, my Master."[17] John Hunter knew the men intimately, too, no doubt: Basire engraved many of his own scientific plates, and Strange directed the execution of the plates for his brother William Hunter's *Anatomy of the human gravid uterus*. And John Hunter, who admired the art of engraving and the artists, counted Woollett as his friend. "Poor Woollett the engraver," he said in one of his lectures, "died under one of these

[10] Wright, *Life of Blake*, I, 18. Mr. Mathew was the Reverend William Henry Mathew of 27 Rathbone Place.

[11] *Loc. cit.*; also, Keynes in Blake, *Writings*, I, 351.

[12] Elizabeth Carter, a distinguished student of literature and the classics, and a scholar for whom Samuel Johnson had the greatest respect. Mrs. John Hunter, herself a poetess, inscribed to her "Carisbrook Castle, a poem, with notes" (A. Hunter, *Poems*, p. 39).

[13] Elizabeth Robinson Montagu, the center of the "bluestocking" literary group in London.

[14] Keeper of Prints and Drawings at the British Museum. He was born in a hackney coach while his father was hurrying to Jermyn Street for William Hunter the obstetrician, John Hunter's brother.

[15] Smith, *A book for a rainy day*, p. 96. It must certainly have been during the 80's that young Mathew was studying with Hunter; in 1792 he took the degree of M.B. at Cambridge.

[16] Paget, *John Hunter*, p. 107; letter from Hunter to Jenner.

[17] Blake, *Poetry and prose*, p. 811.

cancer-curers: he was under my care when this person took him in hand. He had been a life-guardsman, I think, and had got a never-failing receipt. I continued to call on Woollett as a friend."[18]

But whether Blake heard the words of the anatomists at the Mathews' or at Basire's, whether directly or indirectly from John Hunter, he made them his own. For all his scurrilous condemnation of them, it was certainly from the bestirring prophets of physiological anatomy, and not by intuition nor divine revelation, that Blake abstracted the facts around which his creative genius wove its magic.

There have been few poets who have so reviled natural science as Blake, nor owed it more. "Science is the Tree of Death,"[19] cried Blake. "Nature has no Outline," he wrote, "but Imagination has. Nature has no Tune, but Imagination has. Nature has no Supernatural & dissolves: Imagination is Eternity."[20] The Imagination, however, craves warp for its loom. And insofar as John Hunter dominated the anatomical investigation of his day, the results of his free and high scientific imagination provided Blake with materials to transmute to beauty.

But more than that, the growing spirit of individualism which fired Hunter to instigate the experimental method animated Blake as well, and rendered possible the existence of even such a contrary genius as his. It was at least in part because Hunter walked alone boldly in science, thereby personifying his contemporaries' desire for the development of independence in all fields of endeavour, that Blake himself could find inspiration in Albion.

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[18] J. Hunter, *Works*, I, 625.

[19] Blake, *op. cit.*, p. 766.

[20] *Ibid.*, p. 769.

Pharmacopoeias as Witnesses of World History

GEORGE URDANG*

It is not very likely that the members of the Florentine College of Physicians who at the end of the fifteenth century compiled a new formulary, were aware of the fact that they were opening up a new era of European pharmacy. This modest compilation, published in 1498 under the title *Nuovo Receptario*, is considered the first European official pharmacopoeia, i.e., the first pharmaceutical standard adapted to the needs of a certain political unit and made obligatory for the physicians and pharmacists of this unit by the authorities concerned.

It took about half a century until the example of Florence was followed in the more or less sovereign German Imperial Free Cities of Nuremberg (*Dispensatorium Pharmacopolarum . . . authore Valerio Cordo*, 1546), Augsburg (*Enchiridion sive . . . dispensatorium . . . pro Reipub. Augstburgensis Pharmacopoeis*, 1564) and Cologne (*Dispensarium usuale pro pharmacopoeis inclytae Reipublicae Coloniensis*, 1565), in the Spanish municipalities of Barcelona (*Concordia Pharmacopolarum Barcinonensium*, 1535) and Saragossa (*Concordia Aromatariorum Civitatis Cesaraugustae*),[1] and in the Italian duchy of Mantua (*Antidotarium Mantuanum*, 1559).

It was for the sake of uniformity in the preparation of drugs and the adaptation of the formulas concerned to the special needs and resources of the political units involved that the official pharmacopoeias came into existence, and these reasons have undoubtedly remained predominant up to the present. Besides, however, we know that, for instance, the issuance of the Augsburg and Cologne standards so shortly after the appearance of the Nuremberg dispensatory was to a very great measure due to scientific emolument and difference of opinion as to the scope of a pharmacopoeia. That these incentives increased steadily in the course of time can easily be proved, and they were activated and given their opportunity by another and very potent factor: the rising nationalistic ideology. An own pharmacopoeia became gradually a matter of national ambition, a part and a proof

* Director, Institute of the History of Pharmacy, Madison, Wisconsin.

[1] Rafael Folch y Andreu, *Die prähispanischen offizinellen Pharmakopöen und die Mitarbeit der Pharmazeuten*, in: Die Vorträge der Hauptversammlung [Gesellscaft für Geschichte der Pharmazie] in Basel [1934], Mittenwald, 1934, pp. 212–223.

of national sovereignty and unity. It is by no means unlikely that, for instance, the *Antidotarium Mantuanum* of 1559 owes its existence not so much to some urgently felt necessity as to the desire of Guglielmo Gonzaga, Duke of Mantua from 1550 to 1587, not to be outshone by the Medicean Cosimo I, Duke of Florence, under whose government the second edition of the Florentine pharmaceutical standard had appeared in 1550.

The Florentine Pharmacopoeias

There is scarcely any better example of the way in which political history has been evidenced on the frontispieces and title pages of pharmacopoeias from the end of the fifteenth to the end of the eighteenth century than the Florentine *Receptario* or, as it was called since 1550, *Ricettario*. The title page of the *Receptario*, published in 1498, was conspicuous by its simplicity (Fig. 1). It carried nothing but a laconic statement of the character of the book reading in English translation as follows:

New Formulary Compiled by the Most Renowned College of the Distinguished Doctors of Art and Medicine of the Magnificent City of Florence.

The colophon, after giving the date of publication (January 10, 1498), the name of the printing company (*compagnia del dragho*)[2] and the names of two men active in the final preparation of the book (master Hieronymo and master Lodovico dal pozzo toschanelli), concludes with the interesting statement that the *Receptario* was brought out "at the request of the executive officers of the guild of the apothecaries." It is the seal of this guild and the mark of the printing company[2] which appear beneath the colophon.

Nowhere in the book are there any of the dedicatory prefaces or phrases so common in those times of autocratic government. The reason is that early in 1498 there was nobody in the city of Florence to whom such a dedication could properly (and safely!) be directed. The Medici family, whose members had lorded over the republic for about a century, had been driven out and were living in exile, their coat of arms chiseled away from their palace at the order of the "*Signoria*" (Executive Council), while the power of the monk and religious reformer, Girolamo Savonarola, who had grown into the actual leadership of Florence since 1494, was

[2] "Two books only are certainly known to bear the signature of this firm, the Marcullus of 26 November 1497 (I A 28045 — book number of the British Museum) and the Ricettario of 10 January 1498 (I B 28059)." Catalogue of Books printed in the XVth Century now in the British Museum, London 1930, Part VI, p. 691.

IMPresso Nella inclyta cipta di Firenze perla compagnia del Dragho adi.x.
di Genaio.M.CCCC LXXXVIII.Emēdato & correcto p maestro Hierony
mo di maestro Lodouico medico & ciptadino fiorātino dal pozzo toscha
nelli: Ad istātia delli Signori Conioli della uniuersita delli spetiali: el
segno della quale sipone in questa presente charta.
A·M·A·
NVOVO RECEPTARIO COMPOSTO DAL
FAMOSSISIMO CHOLLEGIO DEGLI
EXIMII DOCTORI DELLA AR
TE ET MEDICINA DEL
LA INCLITA CIP
TA DI FIREN
ZE

FIG. 1. Title Page and Colophon of the Florentine *Receptario* of 1498.

rapidly fading. As a matter of fact, it was in the very year of publication of the *Receptario* that Savonarola was condemned to death and perished at the stake. The uncertainty of the political situation is mirrored by the deliberate and almost fearful neutrality of the title page of the first European official pharmacopoeia.

When about half a century later, in 1550, a second edition of the Florentine pharmaceutical standard appeared — from now on known as *Ricettario* — the political circumstances in Florence had changed considerably, and the title page of the new book tells the story with all possible eloquence. It is stated that this edition had been prepared by the College of Physicians on order of the *Duca Di Firenze* and it is now the duke who is honored by flattering superlatives (*illustrissimo et excellentissimo*) instead of the physicians and their college. Even the printer calls himself proudly *Stampator Ducale*.

It was the inglorious Alexander de' Medici who in 1532, through fortunate circumstances rather than his own merit, became the first Duke of Florence, a dignity which, after Alexander had been assassinated in 1537, was taken over by Cosimo de' Medici, called Cosimo I. The political changes between 1498 and 1550 are illuminated not only by the text but still more by the coat of arms printed on the title page of the new standard, by its fact as well as its kind.

The original coat of arms of the Medici showed six simple red balls without any distinction among each other on a field of gold[3] and there was no diadem of any kind. In the new arms, there is not only a coronet surmounting the blazon but some other details previously lacking. The most remarkable and lasting of these new features is represented by the three royal lilies of France in the uppermost ball which were inserted into the blazon of the Medici by Louis XI of France (1423–1483)[4] and received a special meaning and emphasis by the marriage of Catherine de' Medici, in 1533, to the French Dauphin, later King Henri II of France. Of individual rather than of lasting importance is the chain of the Imperial Order of the Golden Fleece which surrounds the blazon and was granted to Cosimo I by the Emperor Charles V. The dove beneath the crown finally may symbolize the peaceful trade of the merchant-ancestors of the present heir or his intention to reign peacefully.

Some remnants of democracy were still noticeable in the book of 1550. It was still the *Ricettario Del Arte, Et Universitate De Medici, Et Spetiali Della Citta Di Firenze*, and the dedication preceding the formulary proper was directed to the officers of the guild. When only seventeen years later, in 1567, a third and completely revised *Ricettario* was issued, this last trace of democracy had disappeared. The book of 1567 was not the work of a

[3] "There is no foundation for the story that the Medici were originally doctors . . . . The story is an entire fable . . ." (G. F. Young, *The Medici*, New York, 1923, Vol. I, p. 20).

[4] *Ibidem*, p. 149.

more or less independent body of physicians and apothecaries anymore. It was not only compiled at the order of the Duke, but also by individuals (twelve) who, although presented by the whole body of the Florentine guild of physicians and apothecaries, were to be elected by the prince or, as the title page puts it, *Dodici Reformatori periti di tal Arte, et eletti da loro Altezze Serenissime*. Furthermore, the book contains a dedication to the Duke full of submissive phrases, and the fact that in the meantime Cosimo I had added Siena to the territory under his rule, becomes evident by the new title *Duca et Principe di Fiorenza et Siena* together with the predicate *Altezze Serenissime* (His Most Serene Highness) quoted above. The edition of 1567 was printed with a permit not only of the Duke but also of his papal protector Pius V (Pope from 1565 to 1572), a fact intimating the intention of helping this formulary to a more national use on the Italian peninsula.[5]

It was this edition that for the first time included the beautiful Renaissance frontispiece which was to be the distinguishing artistic mark of the Florentine *Ricettario* until the end of the seventeenth century. The coat of arms at the bottom of the engraving lacks two features present on the title page of the edition of 1550 (Fig. 2). After a period of conquest there was apparently no space anymore for the dove of peace which is replaced by a large Florentine lily.[6] The Imperial Order of the Golden Fleece has likewise disappeared. The House of Medici had grown too powerful to allow a display of a distinction bestowed upon its head by another sovereign, be it the emperor himself. Even the coronet surmounting the blazon, a rather simple diadem in 1550, is changed into a more ornamental headgear. Only two years later, in 1569, the diadem was to become still more distinctive and distinguishing.

At this time the House of Medici was at the height of its political power and glory. The territory that Cosimo I had brought under his rule comprised the whole of Tuscany and, in 1569, he had achieved the recognition of his enhanced position among the princes of his time by having the title of Grand Duke of Tuscany bestowed upon him by Pope Pius V.[7] *Gran Duca, et Principe di Toscana* is the title by which the title page of the *Ricettario* of 1573, a reprint of the book of 1567 with changes only on

[5] As to details see A. Corradi, *Le prime farmacopee italiane*, Ann. Univ. di Med. e Chirurg. 1887, cclxxix: 3, 179, 254, 321; cclxxxi: 81.

[6] The Florentine lily as well as the French fleur-de-lis represent the iris. But where the French one shows only the leaves, the Florentine one shows both, the leaves and the flowers.

[7] The title "Grand Duke" as the designation of a prince ranking between a Duke and a King appeared here for the first time in history.

frontispiece and title page, refers to Cosimo I. In the papal bull creating the new rank, the shape of the grand ducal crown was carefully laid down:

This ordered that the crown of Tuscany was (unlike the French, Spanish, and other crowns) to be "radiated like that of the Eastern kings, alternate with the Florentine lily." It was a royal crown with the points curving outwards, intended

EL RICETTARIO
DELLARTE. ET
VNIVERSITA DE
MEDICI, ET SPETIALI
DELLA CITTA
DI FIRENZE.
RIVEDVTO DAL COLLEGIO
DE MEDICI PER ORDINE DEL-
LO ILLVSTRISSIMO ET ECCEL-
LENTISSIMO SIGNORE
DVCA DI FIRENZE.
M. D. L.

FIG. 2. Frontispiece of the Florentine *Ricettario* of 1550.

FIG. 3. Frontispiece of the Florentine *Ricettario* of 1573.

to represent the blades of the iris. In the centre of the front was a large red Florentine lily: thus making the crest of Florence's ancient Republic the chief jewel of the royal crown.[8]

It was this crown that from now on, beginning with the reprint of the book of 1567 issued in 1573, replaced the ducal coronet on the frontispieces of the *Ricettario Fiorentino* showing the arms of the Medici.

A brief explanation of other significant parts of this famous frontispiece may not be out of place. The sign of the Florentine apothecaries (the Virgin with the Child on her right side) which formed a part of the

[8] G. F. Young, *l.c.*, Vol. II, p. 298.

colophon of the first (1498) edition reappears, this time, however, not in the form of a conventionalized seal but as an individual piece of art. Of the two figures flanking the booktitle the one to the right is characterized as a pharmacist by the spatula and the ointment box in his hands, while the man to the left, exhibiting his learning by an open herbal, is to represent medicine. It is an amusing accident that the letters M.D. are placed on his pedestal. In this case they do not mean Doctor of Medicine. They represent the Roman notation for 1,500 to be completed by the numerals for 73 on the other pedestal, together signifying 1573, the year of issuance of this edition (Fig. 3).

As pointed out above, the last edition of the *Ricettario* to show the Renaissance frontispiece appeared in 1696. It was not until 1789 that another official Florentine pharmaceutical standard was issued, and its title page evidences clearly the dawn of a new time. Since the House of Medici had become extinct in 1737, their coat of arms naturally had no place on the title page anymore. It could, however, have been replaced by that of the Habsburg princes who succeeded the Medici as Grand Dukes of Tuscany. Instead it is supplanted by an engraving showing Asclepios and Hygiea, the patrons of health and public welfare, and breathing the spirit of the Enlightenment preceding the French revolution just looming on the horizon. If it would not be for the printer's calling himself *Stampatore Granducale*, nothing on the title page of this book would remind the reader of a princely government (Fig. 4).

ROME, VENICE AND THE ITALIAN KINGDOM

It is significant of the comparatively quick changes of the political situation in the Italian states that arose and declined between the sixteenth and the nineteenth centuries, that the official pharmacopoeias issued by the governments concerned passed through several editions only in very few cases. The Florentine *Ricettario* was one of these cases. The standards issued in Rome and in Venice were others.

It was in 1583 that the first edition of the *Antidotarium Romanum*, compiled by the *Collegium Medicum* of the Eternal City and dedicated to the Pope Gregory XIII, made its appearance. New editions, reprints, and translations — the original was written in Latin — were issued during the following century, the last one coming out in 1683. The eighteenth and the first half of the nineteenth centuries passed without a new enterprise of this kind. Apparently in this most international city the need for an own official pharmaceutical standard was not felt strongly enough to be realized.

Only when the political independence of papal Rome was seriously threatened, in 1868–69, a new Roman pharmacopoeia, the *Codice Farmaceutico Romano, teorico, pratico, compilato e pubblicato per ordine di sua santità Papa Pio XI*, appeared. It could not save the Eternal City from losing its sovereignty and becoming the capital of the new Kingdom of Italy.

RICETTARIO
FIORENTINO
NUOVAMENTE COMPILATO
E RIDOTTO ALL' USO MODERNO
DIVISO IN DUE PARTI
PARTE PRIMA

FIRENZE MDCCLXXXIX.
PER GAETANO CAMBIAGI STAMPATORE GRANDUCALE

CON APPROVAZIONE.

FIG. 4. Title Page of the Florentine *Ricettario* of 1789.

MINISTERO DELL'INTERNO

DIREZIONE DELLA SANITÀ PUBBLICA

FARMACOPEA UFFICIALE

REGNO D'ITALIA

ROMA
TIPOGRAFIA DELLE MANTELLATE
1892

FIG. 5. Title Page of the First Edition of the *Farmacopea Ufficiale* of the New Italian Kingdom (1892).

Papal Rome's international character was based on its being a center of faith and church politics leaned toward the past. The internationality of Venice was based on its being a center of trade and trade politics tended to look forward. It was for this reason that Venice and not Rome achieved one of the foremost places in the history of early European printing. Some years before the issuance of the Florentine *Receptario*, there appeared in Venice two of the most renowned unofficial formularies of the Renaissance period, the *Lumen Apothecariorum* of Quiricus de Augustis de Thertona (1495 and 1497) and the *Luminare Majus* of G. G. Manlio de Bosco (1494, 1496 and 1499),[9] and were reprinted at the same place in quite a number of editions. From Venetian printing presses came modified reprints of the

[9] According to A. C. Klebs, Incunabula, *Osiris*, Vol. IV, 1938, pp. 65 and 220, there appeared earlier editions of the book of Quiricus de Augustis in Turin in 1492 and in Cremona in 1494, and a print of Manlio de Bosco's *Luminare Majus* in Pavia in 1494.

Florentine *Ricettario* and the official Mantuan standard of 1559 mentioned above was printed in Venice. Was the fact that Venice did not decide upon an official pharmacopoeia of its own until the early seventeenth century due to the circumstance that it was a center of pharmaceutical literature, making the appearance of a series of official books by rival city republics a prerequisite for the awakening of Venetian nationalistic pride in this field? Anyway, the first official *Venetian Pharmacopoea sive de vera pharmaca conficiendi et praeparandi methodo . . . libri duo*, commonly called *Pharmacopoeia Veneta* did not appear until 1617. It was followed by new editions in 1667, 1730 and 1781. In contrast to the Florentine standard which appeared in the vernacular from the very beginning, the language of all editions of the *Pharmacopoeia Veneta* was Latin. The fact that in 1790 the Venetian republic broke with this old tradition and issued an official formulary in Italian, the *Codice farmaceutico per lo stato della serenissima republica di Venezia*, proves that at this time the rising tide of Italian nationalism had overcome the aristocratic resistance of this republic of nobles.

The legal authority of this *Codice* did not last very long. The seizure of the republic by the Austrians in 1798 followed in 1814–15 by the creation of a Lombardic-Venetian Kingdom within the frame of the Austrian monarchy, made the *Pharmacopoea Austriaca* the official pharmaceutical standard up to 1859 in Lombardy and Venice and up to 1866 in Venice alone.

"In many of the Italian states the dispensatory published by Orosi under the title '*Farmacologia teorica e pratica, ovvero Farmacopea Italiana*' was used as a standard authority; later also the '*Farmacopea Nazionale e Generale, Materia Medica e Terapia*' by Ruata."[10] The book of Guiseppe Orosi, published for the first time in 1851, lived to see four editions. The formulary of Ruata was published in 1883 and followed by an appendix in 1884. Although the success of these private books proved convincingly the need for a modern national pharmacopoeia and in spite of the fact that a commission for the compilation of such a standard had been appointed soon after the creation of the new Italian Kingdom, it was not until 1892, i.e., after more than twenty years, that the *Farmacopea Ufficiale del Regno D'Italia* was issued (Fig. 5). According to Charles Rice "repeated changes had been made in the personnel of the commission" before results could be obtained. In all probability it was the still existing cleavage between North

[10] Charles Rice, The Study of Pharmacy, Introduction, in *The Pharmaceutical Era*, 1895, Vol. 13, p. 68.

and South Italy which was at the bottom of the differences of opinion among the individuals concerned.

Germany

As in Italy, there has always been difference of opinion between North and South in Germany. But in contrast to Italy, there has been in Germany a willingness and talent to organize and to be organized which, in the case of a national pharmacopoeia, united the German pharmacists even before political unification had taken place. As pointed out above, in Italy it was single individuals, Orosi and Ruata, who before and even after the establishment of a unified Italy compiled private books which they called *farmacopea Italiana* or *farmacopea nazionale*. In Germany it was organized pharmacy, representing the whole profession, that in the sixties of the nineteenth century in anticipation of the political development created a work intended by its authors and promoters to constitute a pharmaceutical standard to be legally enforced by all German states and thus binding all German pharmacists. This attempt was all the more remarkable as it showed the pharmacists to be ahead of the governments of the individual German states which still issued new editions of their state pharmacopoeias (Hessia in 1860, Hanover in 1861, Prussia in 1862).

It was on the basis of a resolution adopted in 1861 at a meeting of the *Allgemeiner Deutscher Apothekerverein* (General German Pharmaceutical Association) that eminent pharmacists from Bavaria (2), Prussia (2), Hanover (1), Thuringia, more specifically Saxe-Weimar (1), Württemberg (1) and finally from Austria (2) compiled a book which appeared in 1865 at Halle under the promising title *Pharmacopoea Germaniae* (pharmacopoeia of Germany.)[11] The political events that followed only one year later, in 1866, were not favorable for the adoption of the new book by all of Germany, as they deprived one of the states represented on the pharmacopoeial committee, Hanover, of its sovereignty and made it a Prussian province, and terminated Austrian participation in the political development of Germany proper. Thus the book was officially enforced in Saxony only and, when a new edition was issued in 1867, the names of the two Austrian members of the original pharmacopoeial committee were no longer listed. Thus this edition already anticipated the "*kleindeutsche*" (in literal translation "small German," i.e., Germany without Austria) solution of the problem of German unification which became a political reality

[11] A. Adlung-G. Urdang, *Grundriss der Geschichte der deutschen Pharmazie*, Berlin, 1935, p. 334.

in 1871. As indicative of the growing domination of Germany proper by Prussia even before the establishment of the new empire, may be mentioned the fact that from 1863 on the majority of the German states adopted the Prussian pharmacopoeia as their legal pharmaceutical standard. After 1866 only Bavaria and Württemberg retained their own books while, as stated above, Saxony adopted the *Pharmacopoea Germaniae*.

When the first official pharmaceutical standard of the new German union appeared in 1872, only one year after the establishment of the *Deutsches Reich*, it was properly called *Pharmacopoea Germanica* (German pharmacopoeia) and not *Pharmacopoea Germaniae* (pharmacopoeia of Germany). It was, by the way, for the same reason that the new emperor was given the title *Deutscher Kaiser* (German emperor) and not *Kaiser von Deutschland* (emperor of Germany).

In the preface of the *Pharmacopoea Germanica* of 1872 the reader is told that the book "is not a new one in the proper sense of the word nor was this by any means intended." The preface goes on to say that "the idea was to collect the formulae contained in the pharmacopoeias of the individual states in a somewhat critical way, and to remodel the *Pharmacopoea Borussica* as well as the *Pharmacopoea Germaniae* paying attention simultaneously to the standards that were used in Southern Germany."[12]

AUSTRIA

In Austria, which until 1806 was one of the most important parts of the old, i.e., pre-Napoleonic German Empire and the rival of Prussia as a dominating power in Germany until 1866, the development of the pharmaceutical standards reflects the political situation step by step. Until the end of the Habsburg monarchy in 1918, Austria had been the empire of a dynasty rather than of a people (or of peoples), with its center in Vienna. The first formulary to be declared official in any part of Austria was the *Dispensatorium pro Pharmacopaeis Viennensibus in Austria* (1570), which by the way, was never printed and had to be copied by the Viennese apothecaries. When, in 1616, the Viennese medical faculty was confronted with the task of deciding upon a new official formulary, they refrained from compiling a book of their own and made an internationally known formulary, the *Pharmacopoeia Augustana*, edition of 1613, the legal pharmaceutical standard for Vienna and the Austrian provinces. It was supplemented in 1618 by an appendix, the *Catalogus Medicamentorum Composi-*

[12] Pharmacopoeia Germanica, Berlin, 1872, p. VI.

torum. Up to 1722 all subsequent editions of the *Pharmacopoeia Augustana* remained in force.

In 1729, the first official pharmacopoeia to be compiled in Austria appeared under the title *Dispensatorium Pharmaceuticum Austriaco-Viennense* clearly indicating the role of Vienna as the focus of government and culture for all of Austria (see Fig. 6). This book passed through six further

FIG. 6. Frontispiece and Title Page of the Second Edition of the *Dispensatorium Pharmaceuticum Austriaco-Viennense* (1729).

editions until 1770. In the meantime, the many countries gained by the Habsburgs through marriage and inheritance primarily and administered as "provinces" of their incoherent empire had shown signs of discontent with what they regarded as overcentralization. When, in 1774, a new official pharmaceutical standard was issued, its title no longer referred to Vienna. It was named *Pharmacopoea Austriaco Provincialis*, placing all the "provinces" of the empire on the same footing. The last editions of this standard were issued in 1794 (Latin) and 1795 (German). It was followed in 1812 by the first *Pharmacopoea Austriaca*. Again this name was significant. The last emperor of the Holy Roman Empire of the German Nation,

Franz II, had in 1804 transferred the title of emperor from the old and fading union of more or less independent German states and princes to the Habsburg Patrimonial Dominions. By this act the emperor, who from now on called himself Franz I, Emperor of Austria, made the name of the *Erzherzogtum Oesterreich* (Archdukedom Austria) the official designation

FIG. 7. Title Page of the Fourth Edition of the *Pharmacopoea Austriaco-Provincialis* (1780).

FIG. 8. Title Page of the Second Edition of the *Pharmacopoea Austriaca* (1814).

of the whole empire under Habsburg rule and the symbol of an attempt at a new and strong centralization of government. The eighth edition of the *Pharmacopoea Austriaca*, issued in 1906, was still in force when what had been left of the Habsburg empire by the treaty of St. Germain (1919), i.e., Austria proper, was annexed by Germany in 1938.[13]

ENGLAND

Like their German colleagues, the compilers of the first pharmacopoeia to be the legal standard for the whole of the United Kingdom, comprising

[13] Otto Zekert, *Ein Beitrag zur Geschichte der Oesterreichischen Pharmakopoeen*, Pharmazeutische Monatshefte, 12, 1931: 2–4, 22–24, 55–57, 75–76; A. Adlung-G. Urdang, *op. cit.*, p. 82.

England proper, Wales, Scotland and Ireland, had the advantage of having at their disposal rather modern official standards used previously in the territories concerned: the London Pharmacopoeia (first issue 1618, last issue 1851), the Edinburgh Pharmacopoeia (first issue 1699, last issue 1841) and the Dublin Pharmacopoeia (first issue 1807, last issue 1850).

It is significant of the political situation at 1618, the year of publication of the first of these standards, the *Pharmacopoeia Londinensis*, that James I, the first of the English sovereigns to call himself King of Great Britain and Ireland and simultaneously King of Scotland (under the name of James VI), restricted himself to commanding "all and singular Apothecaries within this our Realme of *England* or the dominions thereof, that they and every of them . . . do not compound, or make any Medicine" in another manner as "set downe by the said booke."[14] He did not impose it upon his Scottish subjects or submit it to the respective Scottish authorities for acceptance. There was naturally still less an idea of making the book official in Ireland.

It was not until 1858 (Medical Act, 1858, Sect. LIV) that it was considered opportune to publish and legally enforce a British Pharmacopoeia instead of the standards which "have hitherto been in use in England, Scotland, and Ireland."[15] When the first edition of the new book made its appearance in 1864, its preface frankly stated that

> of the several functions conferred on the General Medical Council of the United Kingdom by the Medical Act of 1858, not one has caused the Council more anxiety than the preparation of the British Pharmacopoeia . . . . To reconcile the varying usages, in pharmacy and prescriptions, of the people of three countries hitherto in these respects separate and independent, — to consult the prepossession of three important public professional bodies, which have ruled long and ably over this branch of Medicine . . . has been no light task.[16]

It remains to be seen whether, under the given circumstances, there will not be a Dublin, or Irish, Pharmacopoeia once again.

That the *Pharmacopoeia Londinensis* of 1618 was the first original pharmaceutical standard to be official not for the territory of a city republic or Imperial Free City, Duchy or Grand Duchy, but for the whole of a nation, testifies to the fact that England proper was unified and its administration centralized to an extent not known by the rest of the contemporary European nations. Even in Spain and in France it was more than a

[14] "A briefe of his MAIESTIES royall Proclamation. . . ", issued on April 26, 1618, in George Urdang, Historical Introduction to "Pharmacopoeia Londinensis of 1618", Madison, Wis., 1944, p. 25.

[15] British Pharmacopoeia, London, 1864, pp. V and VI.

[16] *Ibidem*, pp. XI and XII.

FIG. 9. Title Page of the First Issue of the London Pharmacopoeia 1618 (Dated May 7, 1618).

FIG. 10. Title Page of the Second Issue of the London Pharmacopoeia 1618 (Dated December 7, 1618).

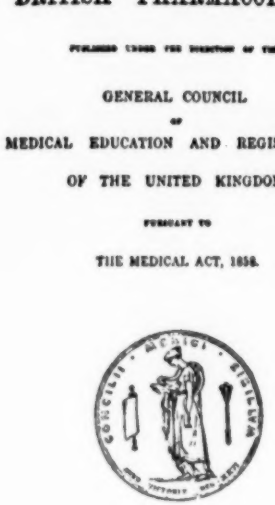


FIG. 11. Title Page of the First Edition of the British Pharmacopoeia 1864.

century later that the political situation made the issuance of national pharmacopoeias possible or advisable.

Spain and France

The first Spanish Pharmacopoeia to be enforced for the whole of Spain was according to Rafael Folch y Andreu[17] the *Pharmacopoeia Matritensis* of 1739. This late appearance of a Spanish national pharmacopoeia had its reason in the fact that until the Spanish war of succession (1707–1714) Catalonia, Aragon and Valencia had still retained some degree of autonomy. For instance, a *Pharmacopoea Catalana* still appeared in 1686. The first Spanish pharmaceutical standard to bear the title *Pharmacopoeia Hispana* appeared in 1794. It is significant that this book was issued during the short period of cultural blossom around 1800 which the country enjoyed under Florida Blanca, prime minister to Charles IV of Spain.

In France the cultural autonomy of the large cities of the country found its expression in local official pharmacopoeias until the second half of the eighteenth century, the *Pharmacopoeia Lugdunensis*, the official pharmaceutical standard of the City of Lyon, published as late as 1778. There was, naturally, a tendency to make the *Codex Medicamentarius Parisiensis*, the first edition of which appeared in 1638 while the last one was issued in 1758, the national standard, and it became indeed, to quote J. Bergounioux, "*grâce à la reputation et aurayonnement de sa* [the Parisian] *Faculté, le guide pharmaceutique officieux du Royaume.*"[18] It was, however, not until the French Revolution had brought about complete centralization of the governmental administration that, by the law of Germinal 21 of the year XI (April 11, 1803), Article XXXVIII, the legal ground was laid for a pharmacopoeia to be obligatory for the whole of France.

The stormy events of the following decade, the period of the rise and the fall of the empire of Napoleon I culminating in the restoration of the Bourbon Kingdom, apparently did not allow the realization of the project. When, in 1816, the book then in progress was declared to be the future official French pharmaceutical standard by the newly established Bourbon King Louis XVIII, he referred to "*l'article 38 de la loi du 11 Avril 1803, qui a prescrit la rédaction d'un nouveau Codex ou Formulaire.*"[19] This reference to a law of the republic was undoubtedly in contrast to the general

[17] R. Folch y Andreu, *l.c.*, p. 215.

[18] J. Bergounioux, *Les editions du Codex Medicamentarius de l'Ancienne Faculté de Médécine de Paris*, Bull de la Soc. d'Hist. de la Pharm. No. 57 (1928): 78.

[19] *Codex Medicamentarius*, Paris, 1818, p. VII.

attitude of the restored royal government. The royal ordonnance quoted was signed by the king as "*donné en notre château des Tuilleries, le huit août, l'an de grâce dix huit cent seize, et de notre règne le vingt deuxième.*" This kind of dating used in all official royal proclamations of this time is highly interesting. Pretending that Louis XVIII had reigned during all the time after

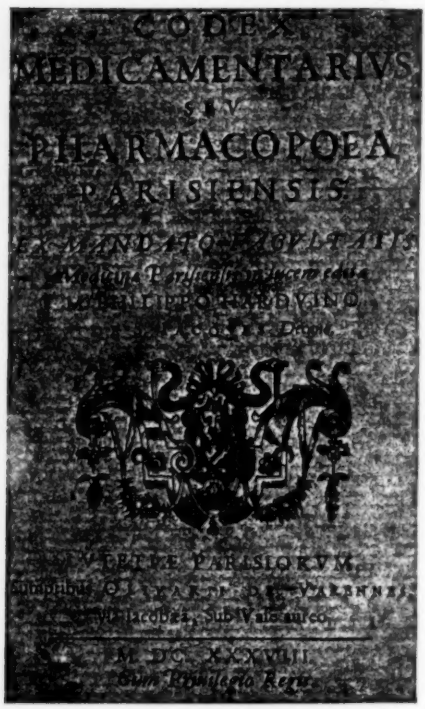


FIG. 12.

CODEX
MEDICAMENTARIUS
SIVE
PHARMACOPOEA GALLICA
JUSSU REGIS OPTIMI
ET EX MANDATO SUMMI REBUS INTERNARUM REGNI ADMINISTRI
EDITUS
A FACULTATE MEDICA PARISIENSI
ANNO 1818.

LIPSIAE
APUD FR. FLEISCHER
1819.

FIG. 13.

FIG. 12. Title Page of the First Edition of the Parisian *Codex Medicamentarius* (1638).

FIG. 13. Title Page of the Leipzig 1819 Reprint of the First Edition of the French *Codex Medicamentarius* (1818).

the death of the unfortunate son of the decapitated Louis XVI and thus trying to eradicate all that had happened during the first French Republic and the Empire of Napoleon I, this dating presents historical evidence for the well known phrase that the Bourbons had forgotten nothing and learned nothing while in exile. It was in 1818 that the book appeared bearing on its title page the title *Codex Medicamentarius sive Pharmacopoea Gallica*, the royal French coat of arms, and the obligatory reference to the royal printing privilege, "*Jussu Regis Optimi.*"

The second edition of the *Codex* appeared in 1837 under the reign of

the so called "Citizen-King" Louis-Philippe of Orleans, and the fact that this *Codex* was issued in the vernacular instead of the traditional Latin, setting an example soon followed everywhere in continental Europe and in the United States of America likewise, testifies to the liberal tendency within the administration. There is no coat of arms, no reference to royal permission on the title page, the title reading *Codex, Pharmacopée Française,*

CODEX,

PHARMACOPÉE FRANÇAISE

PAR ORDRE DU GOUVERNEMENT

MM. LES PROFESSEURS DE LA FACULTÉ DE MÉDECINE,

PARIS

BECHET JEUNE,

LIBRAIRE DE LA FACULTÉ DE MÉDECINE DE PARIS,

1837

Fig. 14. Title Page of the French *Codex* of 1837.

CODEX

MEDICAMENTARIUS

PHARMACOPÉE FRANÇAISE

PAR ORDRE DU GOUVERNEMENT

PROFESSEURS DE LA FACULTÉ DE MÉDECINE

ET DE L'ÉCOLE SUPÉRIEURE DE PHARMACIE DE PARIS

MEMBRES DE L'ACADÉMIE IMPÉRIALE DE MÉDECINE

ET DE LA SOCIÉTÉ DE PHARMACIE DE PARIS,

PARIS

J. B. BAILLIÈRE ET FILS

1866

Fig. 15. Title Page of the French *Codex Medicamentarius* of 1866.

Rédigée par Ordre du Gouvernment par une Commission Composée de MM. les Professeurs de la Faculté de Médécine, et de L'École Spéciale de Pharmacie de Paris. Furthermore, there is no special dedication to the king nor any phrase of reverence or flattery in the preface.

When, in 1866, the third edition of the *Codex* was issued, the regime of Louis-Philippe (1830–1848) and the second republic following it (1848–1852) had long ceased to exist. Again the title page refers to an "*Ordre du Gouvernment.*" That this "*Gouvernment*" was quite a different one, however, is evidenced by the fact that the seal of the *Ministère de L'Instruction Publique* shows the Imperial coat of arms adopted by Napoleon I and now used by his nephew, Louis Napoleon, or as he called himself after his ascendance to the throne, Napoleon III. It was the great apothecary-chemist and statesman, Jean Baptiste Dumas who, in his capacity as President of the Pharmacopoeial Committee wrote the preface to the new book. It

mirrors this epoch in French politics that he overdid himself in flattering the emperor who, as Dumas put it, "*par son rôle dans le monde, avec les grands desseins que Sa Majesté poursuit dans l'intérêt des peuples, et qu'elle accomplit chaque jour avec une gloire immortelle, en vue du progrès de la civilisation générale.*"[20]

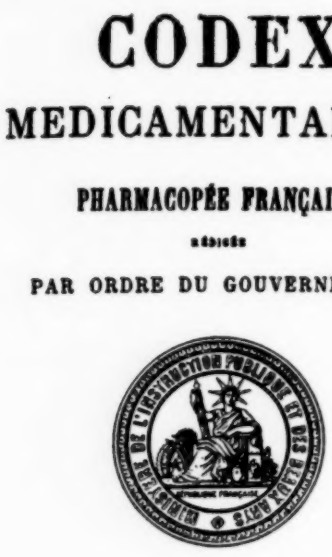


FIG. 16.

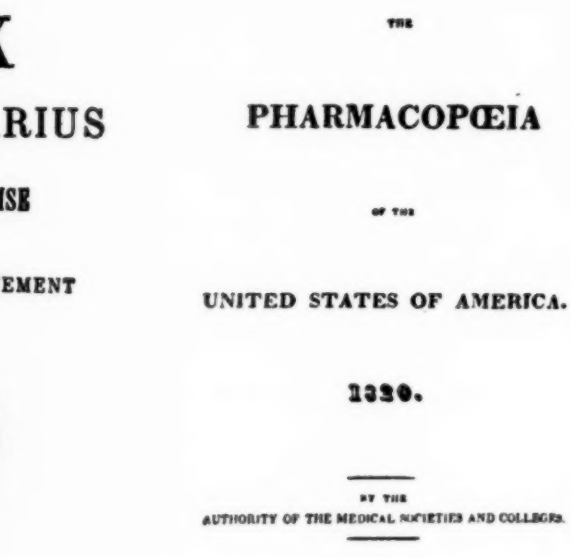


FIG. 17.

FIG. 16. Title Page of the French *Codex Medicamentarius* of 1884.

FIG. 17. Title Page of the First Edition of the Pharmacopoeia of the United States of America (1820).

There are no such flowery phrases in the preface to the fourth edition of the *Codex* published under the Third Republic in 1884, and it is the sign and the symbols of the République Française which greet the reader in the seal of the *Ministère de L'Instruction Publique et des Beaux Arts* adorning the title page.

THE NETHERLANDS AND BELGIUM

That the intricate history of The Netherlands, of Belgium and Holland, has been mirrored in the pharmaceutical standards of these countries is

[20] Codex Medicamentarius, Pharmacopée Française, Paris 1866, p. XXXVIII.

easily understood, especially as since the sixteenth century this industrious area has become one of the international drug trade and transit centers as well as famous for its institutions of learning and its printing presses.

It was at Antwerp that the modified edition of the dispensatory of Valerius Cordus, which was to become the basis of a host of later ones printed at Amsterdam, Leyden, Lyon, Naples, Nuremberg, Paris and Venice, was prepared by the apothecary Pieter Coudenbergh, and printed for the first time by the renowned printer Christoph Plantin in 1568. It went through a series of editions and remained the official Antwerp pharmaceutrical standard for about a century. Almost all of the bigger cities in the Low Countries, the present Belgium, as well as in the present Holland, at one time or another issued official pharmacopoeias. For the territory which was under Austrian rule after the peace of Rastatt (March 7, 1714), the *Dispensatorium Pharmaceuticum Austriaco-Viennense*, reprinted in Brussels in 1747, and since 1774 the *Pharmacopoea Austriaco Provincialis*, reprinted at Louvain in the same year, were given the authority of legal standards. A translation of the latter into Dutch was published in 1781 at Rotterdam under the title *Apothek der Oosterrykssche Staaten*.

It was the establishment of the Batavian republic (1795–1806) that, for the first time, gave the country a national pharmacopoeia. A decree of the "*Duodecimviri reipublicae gerendae*" of July 29, 1803 proclaimed that "there shall be one pharmaceutical code for the entire Batavian republic according to which all pharmaceutical stores shall be administered" ("*Sit universae Reipublicae Batavae unus Codex Pharmaceuticus, ad cujus normam pharmaceuticae officinae omnes institutuantur*").[21] This book, considered to be "by far the best pharmacopoeia of its time"[22] appeared in 1805 in Amsterdam, bearing the title *Pharmacopoea Batava*.

This standard remained in use during the shortlived Kingdom of Holland (1806–1810), under Louis Bonaparte, one of the brothers of Napoleon I, the French domination of the Low Countries (1810–1815), and finally the first eight years of existence of the Kingdom of the Netherlands comprising Belgium and Holland and created by the so called Congress of Vienna in 1815. In 1823 the *Pharmacopoea Batava* was replaced by the first official formulary to bear the title *Pharmacopoea Belgica*. An official Dutch edition (translation from the Latin original into Dutch) appeared in 1826 under the title *Nederlandsche Apotheek*, and it is significant that in the Latin edition King Wilhelm I is called "*prospiciens optimus universi Belgii Rex*,"[23]

[21] *Pharmacopoea Batava*, Amsterdam, 1805, p. XXIV.

[22] Charles Rice, *l.c.*, p. 68.

[23] *Pharmacopoea Belgica*, The Hague, 1823, p. IV.

while the Dutch translation refers to him simply as "*onze geliefde Koning*"[24] (our beloved King).

In consequence of the Belgian revolution of 1830, an armed protest of the Catholic Belgians against what they thought to be the predominance of the Protestant Dutch within their common realm, Belgium and Holland were separated once again, and in 1831 Belgium became an independent kingdom under Leopold of Saxe-Coburg. It took in both countries more than twenty years before new official formularies were issued, the *Pharmacopoea Belgica Nova* (1854) and the *Pharmacopoea Neerlandica* (1851). It is interesting that the latter and all its following editions continue to carry on their title pages the coat of arms of the royal House of Orange that adorned the *Pharmacopoea Belgica* of 1823 and the *Nederlandsche Apotheek* of 1826, while the *Pharmacopoea Belgica Nova* and its successors bear on their title pages the coat of arms of the new Belgian kingdom. The official numbering of the present Belgian pharmacopoeia takes its start from the *Pharmacopoeia Belgica Nova* of 1854 and not from the *Pharmacopoea Belgica* issued in 1823.

POLAND, RUSSIA AND FINLAND

Like the Kingdom of the Netherlands, another creation of the Viennese Congress, so-called Congress Poland, was only shortlived. Alexander I of Russia, adopting the title of a King of Poland, granted the part of the old Polish realm that had fallen to him in 1815, a liberal constitution and full autonomy. It was during this epoch, in 1817, that the first official Polish pharmaceutical standard, the *Pharmacopoeia Regni Poloniae* appeared. In the preface to the book, the authors explain the situation as follows:

> In so far as the kingdom of the fathers in time past has been without an own pharmacopoeia and such a book can no longer be missed in the reborn realm, we have prepared this very work under the Auspices of the Most Merciful Monarch, Restorer of the Fatherland and Supreme Protector of the Sciences and Arts, and upon order and authority of the Ministry of the Interior and Public Education . . . (*Qua olim Patrium Regnum carebat Pharmacopoeia propria, ea ne diutius regenerato desit, sub Auspiciis Clementissimi MONARCHAE, Patriae Restitutoris, Summique Literarum et Artium Protectoris, jussu et auctoritate Ministerii Administrationis rerum internarum et disciplinae publicae, opere hocce curavimus . . .*)[25]

This pharmacopoeia did not live to see another edition. When in consequence of the unsuccessful Polish revolutionary attempts to regain full independence, the successor to Czar Alexander, Nicholas, in 1832 de-

[24] *Nederlandsche Apotheek*, The Hague, 1826, p. V.

[25] *Pharmacopoeia Regni Poloniae*, Warsaw, 1817, p. V.

prived Poland of autonomy and degraded her to the status of a Russian province, there was no room anymore for such a proof and symbol of national sovereignty as an independent official pharmacopoeia. It took more than a century until, in 1937, another official Polish pharmaceutical standard was issued, this time for all of Poland ,i.e., not only for the Polish territory formerly under Russian rule, but also for the parts which in 1817 had been under Prussian and Austrian domination.

It was, after all, Western civilization that expressed itself in the official European pharmacopoeias, and until quite recently Poland as well as Russia were at the receiving rather than at the contributing end of this civilization. As to beaux arts and belles lettres the political conditions from the end of the eighteenth to the beginning of the twentieth century offered a kind of incitement of oppositional forces resulting in a production of remarkable standing and originality. For the sciences and in particular medicine with its correlates, hygiene and public welfare, the possibilities were very restricted. While Poland tried to disprove this fact, very probably just because of her being bound to her big Eastern neighbor politically, Russia admitted it. Although the Russian Academy of Science at St. Petersburg already issued a *Pharmacopoea Rossica* in 1778 (reprinted in 1782), and the Russian Imperial Medical College residing at the same place published another formulary under the same title in 1798 (reprinted in 1803), these books were not legally enforced by the authorities, and it was not until 1866 that the first official Russian pharmaceutical standard, the *Rossiïskaya Pharmacopeya*, was issued and made obligatory. It is significant that an official formulary for the use in the Russian army appeared as early as 1765.

Starting its pharmacopoeial history almost the same way and at the same time as Poland, another borderstate of Russia, Finland, was more lucky as to its continuation. Although under the political control and the cultural influence of Sweden for centuries, Finland had always retained some kind of political autonomy and when the Swedes had to cede the country to the Russians in 1809, the Russian Emperor Alexander I granted Finland a free constitution and fundamental laws, and it became a semi-independent Grand Duchy with the emperor as Grand Duke. There developed a strong tendency towards a national civilization, and it was undoubtedly in consequence thereof that in 1819 the first *Pharmacopoea Fennica* was issued "*cum gratia et privilegio Sacrae Imperialis Majestatis*" notwithstanding or, as far as the Russian consent was concerned, even because of the fact that only two years earlier, in 1816, a new and excellent Swedish

pharmacopoeia (5th edition) had been published. It testifies to the consistency with which the Finns resisted all later attempts at russification that there was no interruption in the issuance of modernized editions of their national pharmaceutical standard. The fifth edition appeared in 1914, and the publication of a sixth one in 1937 proved to the world that Finland intends to carry on her national and cultural tradition.

As this survey has been dealing with official pharmaceutical formularies only, it may seem that there is no room for the Pharmacopoeia of the United States of America which never has been an "official" pharmaceutical standard in the sense in which this term has generally been understood. It is, however, world history as mirrored by pharmacopoeias that represents the real topic, and the historical fact of democracy as a working principle has certainly been mirrored by the Pharmacopoeia of the United States in a unique and convincing way. In an article on "The Place of Latin in the Official Standards of Pharmacy,"[26] this writer described the very special character of the United States Pharmacopoeia as follows:

> From its very beginning, the United States Pharmacopoeia has been first, a private undertaking of American medicine and, in the course of development, of pharmacy and medicine. It was with justified pride that a reviewer of the first (1820) edition wrote in the Medical Repository: "France, by command of her Monarch has furnished her *Codex*, but it remained for American Physicians to frame a work which emanates from the profession itself, and is founded on the principles of Representation. It embodies a *Codex Medicum* of the free and independent United States . . . "[27]
>
> The Federal Food and Drug Laws of 1906 made the United States Pharmacopoeia as well as the National Formulary the legal standards for drugs, thus granting these private books legal recognition. This recognition, however, has not interfered with the preparation of these books by organized pharmacy and medicine, and has left entirely to the sense of responsibility of these professional groups the manner of dealing with the subject matter concerned . . .

SWITZERLAND

There is another country representing a union of more or less autonomous political units, in which the development took a somewhat similar course: Switzerland. As in the United States of America, it was the voluntary work of an organized group of professionals, in this case the *Schweizerische Apothekerverein* which, appearing for the first time in 1865 under the title *Pharmacopoea Helvetica*, gradually gained general recognition. Its second edition (1872) was legally introduced by the majority (all but three)

[26] Bull. National Formulary XII, 1944: 205.
[27] Kremers-Urdang, History of Pharmacy, Philadelphia, 1940, p. 242.

of the individual Swiss political units (cantons), and its third edition (1893) was declared the official Swiss Pharmacopoeia by the federal authority, the *Schweizerische Bundesrat*, obligatory in all of Switzerland with the exception of the canton of Glarus which had refused recognition and — a significant sign of the genuineness of the Swiss democratic system — had her way. The fourth and the fifth editions (1907 and 1933), finally, were

PHARMACOPOEA
HELVETICA,
IN
DUAS PARTES
DIVISA,
QUARUM PRIOR
MATERIAM MEDICAM,
BOTANICO-PHYSICO-HISTORICO
MEDICE DESCRIPTAM,
POSTERIOR
COMPOSITA & PRÆPARATA,
MODUM PRÆPARANDI,
VIRES & USUM EXHIBET.
SCITE & CONSENSU
GRATIOSI COLLEGII MEDICI
BASILEENSIS
DIGESTA
PRÆFATUS EST
ALBERTUS de HALLER,
ACCEDUNT
SYLLABUS
MEDICAMENTORUM,
SUB
CLASSES DIVISUS,
ET
DUO INDICES NECESSARII,
PRIMUS
MORBORUM & CURATIONUM,
ALTER
TRILINGUIS, LAT. GERM. GALL.
BASILEÆ,
Sumptibus & Literis
Jon. Rud. Im-Hof & Filii.
1771.

FIG. 18. Frontispiece and Title Page of the *Pharmacopoea Helvetica* of 1771.

adopted by all cantons and were, therefore, declared official for all of Switzerland. In contrast to the procedure in the United States of America, the Swiss federal government has a hand in the appointment or confirmation of the members of the pharmacopoeial Committee responsible for the preparation of the official standard.

The title *Pharmacopoea Helvetica* had already been used for a predecessor of the modern bearer of this designation, namely for a book appearing in 1771 and prefaced by the famous physician, polyhistor and poet Albrecht von Haller (1708–1777). Although widely used, this excellent work was

never legally enforced in all or even the majority of the Swiss political units. There is a frontispiece in the book of 1771 showing the coat of arms of the thirty-two autonomous areas constituting the Swiss republic. It discreetly intimates the difficulties standing in the way of a simultaneous adoption of the same standard throughout the country.

OUTLOOK

At present we are at the threshold of a new period in world history. The trend seems to be towards greater unification. The extent to which this will be realized in the fields of politics and culture will undoubtedly be mirrored by the pharmacopoeias to be issued in the future, by their appearance as well as by their contents.

The Two Earliest Dentistry Woodcuts

CURT PROSKAUER

THE *Artzney Buchlein wider allerlei kranckeyten und gebrechen der tzeen* (booklet of remedies against all sorts of diseases and infirmities of the teeth), better known under the name of *Zene Artzney* (remedies for the teeth), was first published in 1530 by Michael Blum at Leipzig.

The first edition of the *Zene Artzney* is extremely important from the point of view of dental history and bibliography. In the words of Sudhoff[1] it is "a landmark in the general evolution of dentistry," being the first book of world literature which in the form of a consistent and comprehensive monograph covers the dentistry of 400 years ago.[2] The book's particular importance for dental iconography is based on the fact that the title page, indicating the contents of the book, bears the first known woodcuts[3] showing a tooth extraction (Fig. 1). Thus the woodcut, the popular technique of illustration during the 15th and 16th centuries,[4] is added for the first time to those artistic media which so far had been used for representing dentistry: sculpture, miniature, drawing, and engraving. The latter technique had been used so far only once, by Lucas van Leyden for his "Dentist."[5]

The many later editions, enumerated by Budjuhn in his bibliographic appendix to the *Zene Arznei of 1530*[6] which because of the great popularity of the booklet appeared during less than 50 years[7] do not show on their title pages the interesting dental woodcut. Yet Weinberger[8] was able to

[1] Sudhoff, Karl: *Geschichte der Zahnheilkunde*. Leipzig 1926, p. 154.

[2] Budjuhn, Gustav: *Die Zene Arznei 1530*. Faksimiledruck mit einer quellenkritischen Untersuchung über die Geschichte des ältesten zahnheilkundlichen Druckes. Vorwort von Karl Sudhoff. (Quellen und Beiträge zur Geschichte der Zahnheilkunde. Ausgewählt und herausgegeben von Curt Proskauer. Band II.) Berlin 1921.

[3] Friedländer, Max J.: *Der Holzschnitt*. Berlin 1926.

[4] Haebler, Konrad: *Handbuch der Inkunabelkunde*. Leipzig 1925, p. 96. Bookprinters started using the woodcut in Europe in 1461.

[5] Proskauer, Curt: *Iconographia odontologica*. Berlin 1926, figs. 1–12.

[6] Budjuhn mentions, besides the first edition, seven more prints.

[7] So far 15 different editions are known as having been published between 1530 and 1576.

[8] Weinberger, Bernhard Wolf: *Orthodontics*. An Historical Review of its Origin and Evolution. Vol. I. Mosby, St. Louis 1926, pp. 90–93, 97–101.

Weinberger, Bernhard Wolf: Dental Literature; Its Origin and Development. *The Journal of Dental Research*, VI, No. 4, December 1924–26, pp. 313–334.

Weinberger, Bernhard Wolf: Early Dental

discover during the last 15 years six more editions which had been unknown to Budjuhn. I myself found a seventh. Not less than five of these seven editions[9] show on the title page the same woodcut as the first edi-

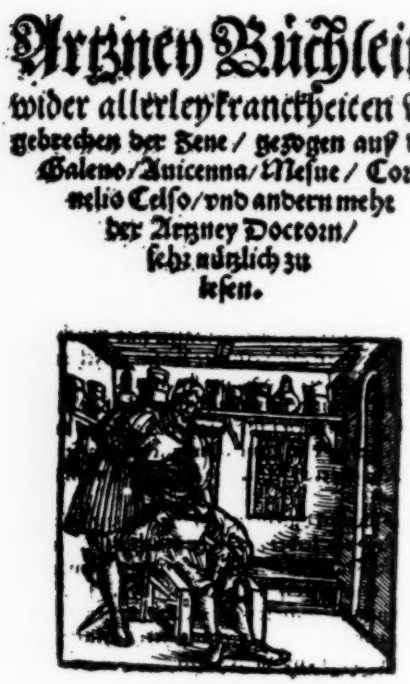


FIG. 1.

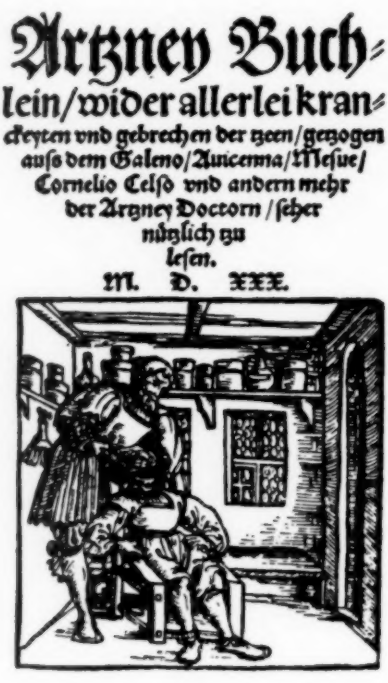


FIG. 2.

FIG. 1. Title Page of the First Edition of the Zene Arznei, Michael Blum, Leipzig 1530.
FIG. 2. Title Page of the Ninth Essay in "Artzneybuch: Fast wunder köstlich . . . " Johann Daubman, Königsberg 1555. Fol. 150v.

Literature. *Bulletin of the Medical Library Association*, Vol. 26, No. 4, May 1938, pp. 222–247.

Weinberger BernhardWolf: Did Dentistry Evolve from the Barbers, Blacksmiths or from Medicine? *Bulletin of the History of Medicine*, Vol. VIII, No. 7, July 1940, pp. 993–996.

[9] (1) 1546. Forms the ninth essay in *Artzneybuch köst- / lich für mancherley Kranckheit* . . . . (Fol. 150v) Melchior Sachse, Erfurt. Fol. [CLv–CLXIIv: Artzney Büchlein wi- / der allerley kranckheiten vnd gebrech / en der Zene, gezogen aus dem Gale- / no, Auicenna, Mesue, Cornelio Celso, vnd / andern mehr der Artzney Doctorn, / sehr nützlich zu lesen. / Fol. (CCLXVII): Gedruckt zu Erffurdt, / durch Melcher Sa- / chssen, Am XIX. / tg Aprilis, / Anno, / M.D. XLvj. / A reproduction of the main title page and of the title page of the Zene Arznei can be found in catalogue XXI of L'Art Ancien, Zürich: Bibliotheca Medica (1938) No. 32. This copy is now in the possession of Dr. Theodor Blum, New York City. The Gesamtkatalog of the Prussian libraries lists another copy (vol. VII, 626) Kiel Univers. Library. A third copy is possessed by the Smithsonian Institute, Washington (Squibb Collection).

(2) 1549. Johann Daubman, Nüremberg. Makes also part of a collective volume. Possessors: British Museum, London. College of Physicians and Surgeons, Philadelphia, Pa. Boston Medical Library, Boston, Mass. University Library Göttingen.

(3) 1555. Johann Daubman, Königsberg. Ninth essay in the Artzneybuch: *Fast wunder*

tion. It is possible that still other editions with this woodcut, as yet unknown, will show up; but as far as our knowledge goes today, three different printers have adorned the title page of the *Zene Arznei* with this same

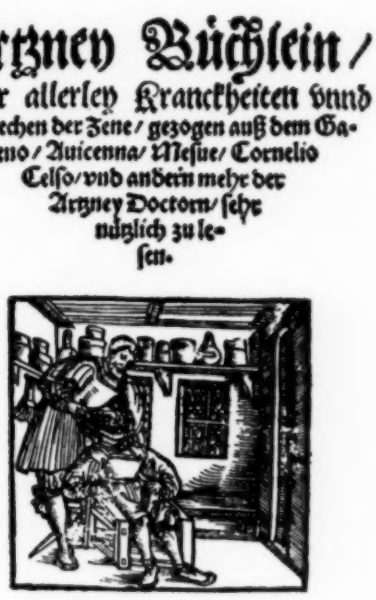


FIG. 3 (*left*). Title Page of the Ninth (Zene Arznei) Essay of the Artzneybuch, Johann Daubman, Nürnberg 1549; and the Colophon of the Entire Book.

FIG. 4 (*above*). Title Page of the Zene Arznei (Ninth Essay of the Hauss Apoteck oder Artzneybuch), Johann Daubman, Königsberg 1565.

dental picture, namely, Michael Blum of Leipzig (1st edition; Fig. 1), Melchior Sachse of Erfurt (7th edition),[10] and Johann Daubman, who had

köstlich . . . (Vol. 150ᵛ). Possessors: New York Academy of Medicine, New York; University Library, Göttingen; Biblioteca Apostolica Vaticana, Roma.

(4) 1556. I succeeded in locating another edition which contains the same woodcut: Johann Daubman, Königsberg. The same edition as the 1555 Johann Daubman, Königsberg edition. Possessors: Prussian State Library, Berlin; University Library, Kiel; British Museum, London.

(5) 1565. Johann Daubman, Königsberg. Makes also part of a collective volume. Possessors: Boston Medical Library; University Library, Königsberg.

[10] These numbers correspond to the latest census of Weinberger in Weinberger 1938, p. 234.

printing shops in Nürnberg and in Königsberg (9th, 10th (Fig. 2); 11th and 13th edition). It is very likely that Michael Blum provided his second edition[11] of the *Zene Arznei* (1543) with the same woodcut as the first. Unfortunately the fact can not be ascertained, as the only known copy of this edition in the Prussian State Library at Berlin lacks the title page.[12] The chronology of the editions bearing the tooth extraction woodcut is thus the following:

1) 1530 Michael Blum, Leipzig.
2) 1546 Melchior Sachse, Erfurt.
3) 1549 Johann Daubman, Nürnberg (Fig. 3, taken from Weinberger).
4) 1555 Johann Daubman, Königsberg.
5) 1556 Johann Daubman, Königsberg.
6) 1565 Johann Daubman, Königsberg (Fig. 4, taken from Weinberger).

At first sight the title pages of these six editions appear identical. More detailed comparison reveals insignificant differences in the design of the woodcuts of the three printers which show that they used three different blocks. As we will see, Sachse and Daubman not only adopted the text of Blum's first edition, but also his illustrations. Sachse copied Blum's original directly, while Daubman copied the enlarged edition of Sachse.

In this context it is necessary to emphasize that during the fifteenth and sixteenth centuries opinions on the rights of an author and reprinting differed entirely from ours.[13] The considerable number of prints which were nothing but reprints of existing editions, were in no way regarded as offensive. A reprint, being composed at less expense, could be sold cheaper on the market; to reprint was not a criminal action, but rather a recognition of the high artistic and scientific value of the product which made it worthwhile to reproduce it.

Another custom likewise does not correspond to our present standards, and therefore appears strange to us. Daubman used the dental woodcut not only for the title page of the *Zene Arznei*, the contents of which were thus symbolized, but also as a title page for two other treatises which have nothing to do with dentistry: the little book of Tarquinius Ocyorus, alias Schnellenberg, *Ein New Büchlein von etlichen edelen vnnd Bewerten Balsamen* . . . (A new book of several noble and proved balms . . .) (Fig. 5), Daubmann 1555 (Fol. 255^{v}) and 1556; and Otho Brunfels' German edition of a treatise of Lanfranci *Ein nützliches wundartzneybüchlein* . . . (A

[11] Would be the 6th edition in Weinberger's general census.

[12] Signature: "an Jh. 1932."

[13] Haebler, Konrad: l.c. pp. 157 and 163 ff.

useful book on wound treatment), Daubmann 1555 (Fol. 118[r]) (Fig. 6), 1556, and 1565 (Fig. 7).[14] These two treatises form parts, chapters with a special title page, of a *Physickbook* which deals with the "external and internal diseases" according to the time-honored scheme "from the head down to the feet," and which besides these two papers and the *Zene Arznei* reprints 10 other treatises of different authors.

The six editions of the *Zene Arznei*, published by different printers[15] between 1530 and 1543[16] had come out of press as independent books.[17] In 1546 Melchior Sachse of Erfurt was the first to combine the popular dental booklet with 12 other popular medical treatises in one volume. Through continuous pagination and a special title page[18] he tried to give to the rather arbitrary collection the appearance of a uniform whole. This idea of Sachse to collect the works of a number of respected authors in one volume seems to have been very successful with the public. Consequently Daubman, of Nürnberg, quickly adopted Sachse's idea and three years later published the first of his three reprints of Sachse's voluminous *Physickbook* (Fig. 8). In all details he followed almost exactly Sachse's example: he gave his book the same external appearance; he also provided it with a collective title page adorned with a beautiful woodcut; and in the selection of the different treatises, their order, and text followed almost exactly the example of Sachse.[19] Only the text of the title of a later, third,

[14] Mr. James F. Ballard, Director of the Boston Medical Library, was kind enough to communicate to me that the treatise of Lanfranci in the Daubman edition of 1549 has a trepanation as title page, the treatise of Schnellenberg in the same edition two plants. The same plants are also found in the Schnellenberg treatise in the Daubman edition of 1565, while the title page of the Lanfranci in this edition bears the dental woodcut.

[15] The qualifications "printer" and "publisher" were used during the fifteenth and sixteenth centuries almost always without discrimination. Budjuhn, l.c. p. 50, footnote.

[16] Budjuhn, l.c. pp. 49–70; Weinberger 1938, p. 234.

[17] The publishers were Michael Blum of Leipzig (1530 and 1543 editions), Peter Jordan of Mainz (1532 and 1532 editions), Christian Egenolff of Frankfurt a.M. (1536 and 1541 editions).

[18] ARtzneybuch, köst- / lich fur mancherley Kranckheit des gan- / tzen leibs. Jnnerlich vnd eusserlich, vom Heupt an, bis auff die / Füsse. Von vielen Hochberümpten vnd Erfarnen Artzten mit / sonderm vleis, ordentlich beschrieben. Vnnd aus brüderlicher / liebe, allermeniglichen zu nutze, heil vnd troste, zů für- / derst aber, den Leib vnd Wundtartzten, zu / grüntlichem vnterricht, Jtzo newe in / Druck vnd an tag gegeben. / .... Register disz Buchs, sampt den Autorn, vnd wouon jeder / schreibet, Findestu bald nach der Vorrede. / Erfurt, M. Sachse, 1546.

L'Art Ancien, Zürich, Catalogue XXI: Bibliotheca Medica (1938) No. 32, pp. 10–14, gives a detailed enumeration and description of the treatises collected in the Physickbook and reproduction of the main title page, the title page of the Zene Arznei, and two other title pages of treatises contained in the Physickbook. Martin von Hase (Erfurter Medizinische Drucke aus der ersten Hälfte des 16. Jahrhunderts. *Sudhoffs Archiv Gesch. d. Med. u. Naturw.* Vol. 30, No. 4 and 5, 1938, pp. 194–219) brings the exact titles of the different treatises of the Physickbook and bibliography.

[19] A description of Daubman's 1555 edition is found in Weinberger 1938, pp. 234–235. W. used the copy of the New York Academy of Medicine.

Ein New Büchlein
von etlichen edelen vnnd Bewerten
Balsam Ole / Wund trencken / Pflaster /
vnnd Vnguenten zu machen / beydes frischen
vnd alten Wunden oder Schäden / vor nye
nie angesehen.
Wun aber alle Wund
Ärtzten zu frommen / vnnd den Not-
dürfftigen zu trost vnnd hülff / Durch Tarqui-
nium Schnellenbergium / der Ertzney Doc-
torem in den Druck bracht.

Fig. 5.

Ein nützliches wund-
artzney büchlein / des Hochberümb-
ten Lanfranci / auß fürbitt des Woler-
samen Meisters Gregorij Fleugauß /
Chyrurgen vnd Wundartzt
zu Straßburg.
Dabey vieler bewerter Recepten /
heilsamer Salben vnd Ertzneyen / ein Auß-
zug / bisher von obgenantem M. Gregorio / für sich
selbst inn grossem werd gehalten / jetzt ge-
meinem nutz zu gut auch in
Druck geben.
Durch
Othonem Brunfels verdeutscht.

Fig. 6.

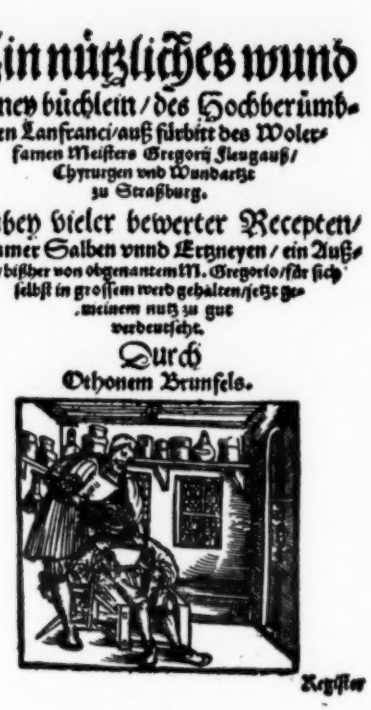

Ein nützliches wund
artzney büchlein / des Hochberümb-
ten Lanfranci / auß fürbitt des Woler-
samen Meisters Gregorij Fleugauß /
Chyrurgen vnd Wundartzt
zu Straßburg.
Dabey vieler bewerter Recepten /
heilsamer Salben vnnd Ertzneyen / ein Auß-
zug / bisher von obgenantem M. Gregorio / für sich
selbst in grossem werd gehalten / jetzt ge-
meinem nutz zu gut
verdeutscht.
Durch
Othonem Brunfels.

Fig. 7.

Fig. 5. Title Page of the Essay of Tarquinius Ocyorus (alias Schnellenberg) in the Two Editions of "Artzneybuch: Fast wunder köstlich . . . " Johann Daubman, Königsberg 1555 and 1556. Fol. 255^{v}.

Fig. 6. Title Page of the Essay of Lanfranci in the Two Editions of "Artzneybuch: Fast wunder köstlich . . . " Johann Daubman, Königsberg 1555 and 1556. Fol. 118^{r}.

Fig. 7. Title Page of the Essay of Lanfranci in the "Hauss Apoteck, oder Artzneybuch . . . " Johann Daubman, Königsberg 1565. Fol. F$_{4}^{v}$.

Königsberg edition (1565) (Fig. 9) is changed through an unimportant rearrangement of words, and the addition of the new title of *Hausz Apoteck* (Domestic Pharmacy).[20] A new trait of these three Königsberg Daubman prints of 1555 (Fig. 10), 1556, and 1565 (Fig. 9) was, as I already pointed out above, the use of the dental woodcut not only for the title page of the *Zene Arznei*, but also for the title pages of *non*-dental writings of the same volume.

This use of a woodcut in a book of which the content was not related to the motif of the picture, was a very common phenomenon in the early days of book printing.[21] We can locate a great number of fifteenth and sixteenth century woodcuts, which were created originally to illustrate a specific text, but were used again, without any regard to the subject depicted, in order to adorn other books or other passages of the same text.[22] This strange fact is explained by the situation in the printing trade of this period. The aim of the publisher of popular books, which like the *Physickbook* were destined for consumption by the large masses of the population, was to provide the publications with as many woodcuts as possible in order to endow them with greater sales appeal. In the course of years great stocks of various blocks, made by different artists, piled up in the storage rooms of the printing houses. They were sorted out at more or less fitting occasions, and were used to adorn sometimes in a very arbitrary way, texts and title pages completely different from those for which they had been destined originally.[23] Little care was taken to achieve a logical connection between text and picture, and still less to maintain unity of artistic style, which latter could have been obtained only if all the woodcuts used for one book had been created *by one and the same artist*. Therefore the fact that the artist of *one* anonymous woodcut in such a volume can be identified,

[20] A reproduction of the main title page of Daubman's Physickbook of 1565, taken from the copy of the Boston Medical Library and a detailed description of the contents is found in Weinberger 1940, pp. 993–996. The title of the Daubman Königsberg 1565 edition of the Physickbook is: Hausz Apoteck, oder / Artzneybuch / Von allerley zufelligen / Jnner vnd eusserlichen, Offen oder heim- / lichen, des gantzen Leibs gebrechen. Aus vielen Alten / vnd Newen, Weitberümbten Erfarnen Artzten, &. / Jetz mit grossem fleis zusamen geordnet, vnd im / Druck verfertigt, durch Johann Daubman. / M.D. LXV. /

[21] Haebler l.c. p. 123.

[22] The dental woodcut of the title page of the Zene Artzney of 1530 is found, besides the six editions of the Zene Arznei already mentioned, on the title pages of the following treatises: (1) Schnellenberg (Tarquinius Ocyorus): *Ein New Büchlein* . . . (in the Physickbook). Königsberg, Johann Daubman, 1555, Fol. 255^{v} (fig. 5); (2) Same. Edition of 1556; (3) Lanfranci-Brunfels: *Ein nützliches wundartzneybüchlein* . . . (in the Physickbook). Ibid. Fol. 118^{r} (fig. 6); (4) Same. Edition 1556; (5) Lanfranci-Brunfels: *Ein nützliches wundartzneybüchlein* . . . (in the Physickbook) Johann Daubman, Königsberg 1565. Fol. F_4^{v} (fig. 7).

[23] Choulant, Ludwig: *Graphische Incunabeln für Naturgeschichte und Medizin*. Leipzig 1858, p. 77.

Artzneybuch,
Vast wunderköstlich/für allerley von jme
selbst/zufelligen/Jnner oder eusserlichen/offen oder heymlichen/des
gantzen Leybs gebrechligkeyt/ Wie nur die mögen Namen
haben/für Mannß vnd Frawen personen/jungen vnnd
alten/sehr nutz vñ dienstlich zu gebrauchen. Von allen
newen vnd alten erfarnen/berhümbesten Ertzten/
zu sammen getragen/gleych als für ein
Hauß Apoteck oder Haußschatz
Der HErr hat die Ertzney von
der erd geschaffen/Vnd der
Ecclesiast. am xxxviij.

Fig. 8.

Hauß Apoteck/oder
Artzneybuch
Von allerley zufelligen
Jnner vnd eusserlichen/Offen oder heim-
lichen des gantzen Leibs gebrechen/Aus vielen Alten
vnd Newen/ Weitberümbten Erfarnen Artzten/ ꝛc.
Jetz mit grossem fleis zusamen geordnet/vnd im
Druck verfertigt/durch Johann Daubman.
M. D. LXV.

Fig. 9.

Artzneybuch,
Vast wunder köstlich/
von jme selbst/zufelligen/Jnner oder eus-
serlichen/offen/oder heymlichen/des gantzen
Leybs gebrechligkeyt/Wie nur die mögen Namen
haben/für Mannß vnd Frawen personen/Jun-
gen vnnd Alten/sehr nütz vnd dienstlich
yeder menigklich zu gebrauchen.
Von allen Newen vnd
Alten erfarnen/berhümbesten Ertzten/
zusammen geetragen/gleich als für ein
Hauß Apoteck oder Haußschatz.
Ecclesiastici. XXXVIII.
Der HERR hat die Ertzney von der Erd geschaffen/
Vnd der Weyse würdt keine schewhe darob haben.
Gedruckt zu Königsperg in Preussen/
durch Johann Daubmann.
M. D. LV.

Fig. 10.

Fig. 8. Main Title Page of the "Artzneybuch," Johann Daubman, Nürnberg 1549.

Fig. 9. Main Title Page of the "Hauss Apoteck, oder Artzneybuch," Johann Daubman, Königsberg 1565.

Fig. 10. Main Title Page of the "Artzneybuch," Johann Daubman, Königsberg 1555.

does not allow the conclusion that other anonymous woodcuts of the same volume are necessarily the product of *the same* artist. It seems to me that this point particularly is of great importance when we try to identify the unknown creator of the often copied title page of the *Zene Arznei* of 1530. Yet strangely enough, this obvious question has so far not been asked either by medical or by art historians,[24] while many other problems connected with the *Zene Arznei* like its bibliography, authorship, or sources have been thoroughly investigated. Only the catalogue XXI, Bibliotheca Medica, of the Art Ancien in Zürich (1938) dedicated to the late Harvey Cushing, in the description of Sachse's *Physickbook* of 1546 (pp. 10–14) mentions as the artist of most of the woodcuts of this print the painter *Hans Brosamer*. This contention is based exclusively on the fact that *one* woodcut, the coat of arms with the date 1534 on the back of the title page, bears the monogram of this artist.[25] It has been pointed out already that to extend such a conclusion from one woodcut to the others in the volume is not automatically admissible. It would be justified only if it could be proved that *one and the same* artist designed the overwhelming majority of the illustrations of this print. Yet the absolutely different style of most of these woodcuts shows clearly that not one, but many artists were instrumental in illustrating the *Physickbook*, or to put it more exactly, that the existing or copied blocks of different artists were used for this book. It can be proved that this assumption is not based on possibly doubtful comparisons of style. I have been able to show that the woodcut of the main title page is not the work of Brosamer[26] but of the so called "Master of Petrarca." This demonstration invalidates the belief that Brosamer was the author of all the pictures of the *Physickbook*. Furthermore, the date on the coat of arms woodcut suggests that the coat of arms was not destined at all for the *Physickbook*. The *Physickbook* appeared twelve years after the date accompanying the coat of arms (1534), that is, in 1546. It is impossible that Sachse already had planned at such an early date the publication of this collection and at that date had commissioned Hans Brosamer to illustrate the book. Rather, we are faced with another example of the custom of using arbitrarily a woodcut as a filler to decorate an empty page, even though the block did not belong there and was only incidentally at hand in the shop. This dismisses as erroneous any conclusion drawn from

[24] Budjuhn l.c. p. 58, footnote, says concerning this problem: "It is to be regretted that nowhere the illustrators of Blum (the publisher of the first edition of the Zene Arznei) or Egenolff (the publisher of several later editions of the Zene Arznei) have been dealt with."

[25] 1534 H B (that is Hans Brosamer).

[26] von Hase says erroneously: the monogrammist A.W.

the coat of arms that Brosamer was the creator of the dental woodcut of the *Physickbook*, all the more so as the original dental woodcut can be demonstrated on the title page of the first *Zene Arznei* of 1530.

The woodcut on the main title page of Sachse's *Physickbook* of 1546[27] and of Johann Daubman's *Domestic Pharmacy* published 1549 and almost 20 years later, in 1565 (see Fig. 9) in Königsberg,[28] represents a room filled with bottles, boxes, and a voluminous chest for spices and herbs. The perfume of the latter is visualized by the gestures of the three inmates of the room.[29] This picture is found already in Francesco Petrarca's *Von der Artzney bayder Glück* (medicine in good and bad times),[30] better known under the name *Trostspiegel*, and published on February 9, 1532 by Heinrich Steyner in Augsburg, on Fol. 25^{v}. This woodcut is a work of the so called "Master of Petrarca."[31] Yet the original piece is larger than the

[27] Reproduced in the catalogue XXI, Art Ancien, l.c. p. 11.

[28] Reproduced in Weinberger 1940, p. 994. This woodcut is a much cruder copy of the title page of the Sachse 1546 edition. Daubman's 1555 edition of the Physickbook (fig. 10) has no pictures on the title page.

[29] The Latin and German verses below the woodcut in this Petrarca edition (Fig. 11) are moralising comments on this picture. "Geschmack" and "schmecken" mean here "Geruch" and "riechen" (Latin odor).

[30] Francesco Petrarca: Von der / Artzney bayder Glück, des gůten vnd / widerwertigen. Unnd wesz sich ain yeder inn Ge- / lück vnd vnglück halten sol. Ausz dem Lateinischen in das / Teütsch gezogen. Mit künstlichen fyguren durch- / ausz, gantz lustig und schön gezyeret. (Woodcut) Gedruckt zu Augspurg durch Heynrich Steyner. / M.D. XXXII. (In fine:) Gedruckt .... Am IX: tag. Februarij, ...

The same woodcut was used again at different occasions, e.g., two years later (1534) as the title page of "*Kreuterbůch oder Herbarius*," published also by Heinrich Stayner of Augsburg. The last time it was published in 1620 in two prints of Vincenz Steinmeyer of Frankfurt: (1) Francesco Petrarca: Trostspiegel in Glück und Unglück. Von Rath, That, vnd Artzney in Glück vnd Unglück, nemblich, wie sich ein jeder verständiger Mensch halten soll. Franckfurt a.M., Joh. Bringers sel. Wittib in verl. Vincenz Steinmayers, 1620; (2) New künstliche / Wohlgerissene, vnnd in Holtz ge- / schnittene Figuren, dergleichen niemahlen / gesehen worden. / Von den Fürtrefflichsten, künstlichsten vnnd Berhümbtesten / Mahlern, Reissern, vnnd Formschneydern, / Als nemblich, / Albrecht Dürer, Hansz Holbeyn, Hansz Sebaldt Böhem, Hansz Scheif- / lin, vnnd andern Teutscher Nation Fürtrefflichsten / Künstlern mehr. / ... Getruckt zu Franckfurt am Meyn. In Verlegung Vincentii Steinmeyers. / ANNO M.DC.XX. / (Fig. 12) The woodcut is found in this print on Fol. D$_{8}^{v}$.

[31] The Preface of the same work ("Vorrede and den Kunstliebenden vnd verstendigen Leser") touches for the first time—300 years ago—the question, who the artist of this woodcut was (Fig. 13). "Weiln ich dann, ... auch e- / ben im werck war, desz Hochgelerten vnd Weitberümpten Oratoris vnd Poeten Franci- / sci Petrarchae Buch, welches er Trostspiegel in glück vnd vnglück, tituliret (demnach die / vorige getruckte Exemplaria, aller abgegangen vnnd verkaufft waren) wiederumb von / newem aufzulegen vnd zu trucken, darinnen dann vber die massen viel schöner Figuren / gehören vnd kommen welche *ein Vortrefflicher vnnd Hochberümpter Meister* (*wie- / wol ohne seinen darbey gesetzten namen*) *gerissen vnd geschnitten*, dasz er auch dem Dü- / rer wol zu vergleichen, *wer er aber eigentlich sey, kan man nicht gewisz wissen, doch er sey / gleich wer er wölle, so ist daran nicht sehr viel gelegen, dann das werck lobet seinen Mei- / ster.*" Thus Steinmeyer leaves the question open who the artist was. Later art historians (Muther 886-Burgkmair Catal. No. 547–804—Passavant III. 275. 106) have declared that Hans Burgkmair the Elder was the creator of the famous woodcuts illustrating Petrarca. Heinrich Roettinger (*Hans Weiditz, der Petrarcameister.* Studien z. Deutschen Kunstgeschichte. H.

two *Physickbook* cuts. It shows along the upper margin another shelf with apothecary jars, and on the left side an oriental fruit and flower garden (Fig. 11). This garden is separated from the interior by a thick wall given

Quam grates mo riens tumulo exhalabis odores? — *Gratus odor tineis putre cadauer erit.*

Der du ſuchſt luſt in frembdem Gſchmack/ — Wird ſchmäcken/ſo du ligſt vergraben

Gedenck wie dir der Madenſack/ — Vnd dich verzehren Wurm vnd Schaben.

D iij

FIG. 11. Francesco Petrarca's "Von der Artzney bayder Glück," Heinrich Steyner, Augsburg 1532. Fol. 25[v]. The Right Part of this Woodcut was used as the Title Page of the Artzneybuch Edition 1546 by Melchior Sachse and of the Two Artzneybuch Editions (1549 and 1565) by Johann Daubman.

in cross section, which thus separates two scenes independent in form and content. The right part is twice as wide as the left (2/3:1/3). Thus the

50. Strassburg (Heitz) 1904) declared Hans Weiditz to be the artist because 3 woodcuts of the Petrarca edition bear the monograph H.W. This opinion was also adopted by Campbell Dodgson (*Catalogue of Early German and Flemish Woodcuts pres. in the Brit. Mus.*, Vol. II, London 1911, p. 144). Ernst Buchner (Der Petrarcameister als Maler, Miniator, und Zeichner. *Festschr. Heinrich Wölflin.* München 1924, p. 209) was the first to show that the artist of the Petrarca woodcuts could not be Hans Weiditz of Strassburg, and proposed to call the anonymous artist the "master of Petrarca." See also Th. Musper: *Die Holzschnitte des Petrarcameisters.* München 1927, and Ida Schoeller: *Die Kunst im Deutschen Buchdruck.* Weimar 1915. It is at any rate certain that the blocks for the Petrarca were cut between 1518 and 1523, and bought by the printer Steiner of Augsburg in 1523 from the printers S. Grimm and M. Wirsung. Around 1550 they passed from Steiner to the printer Christian Egenolff of Frankfurt. Vincenz Steinmeyer acquired them from Egenolff's heirs. I have dwelt in great detail on the question of the master of Petrarca, though this title page woodcut is of now dental character. But a dental woodcut (Proskauer 13) will be discussed later, which comes from the Petrarca Trostspiegel, and this question will then not have to be taken up again.

woodcutter who needed a quadratic picture for the title page of the *Physickbook*, could copy the right, independent part of the more voluminous Petrarca original without doing any violence to the contents of his model.[32]

The artist of the title page of the *Physickbook* is thus found, but the question of the artist of the *Zene Arznei* woodcut is answered only in a negative sense. Because of their completely different stroke neither the master of

Newe Künſtliche/
Wohlgeriſſene/ vnnd in Holtz ge-
ſchnittene Figuren/ dergleichen niemahlen
geſehen worden.
Von den
Fürtrefflichſten/ Künſtlichſten vnnd Berühmbteſten
Mahlern/ Reiſſern/ vnnd Formſchneydern/
Als nemblich/
Albrecht Dürer/ Hanß Holbein/ Hanß Sebaldt Böhem/ Hanß Scheuf-
lin/ vnnd andern Teutſcher Nation Fürtrefflichſten
Künſtlern mehr.
Allen Mahlern/ Kupfferſtechern/ Formſchneydern: Auch allen Kunſt-
Verſtändigen/ vnnd derſelben Liebhabern/ zu Ehren vnd gefallen: Wie auch den
angehenden Kunſtliebenden Jugendt zu nutz vnd beförderung
in Truck geben.
Getruckt zu Franckfurt am Meyn/ In Verlegung Vincentii Steinmeyers.
ANNO M. DC. XX.

FIG. 12. Title Page of the Book in which there is also the Woodcut of the so-called "Master of Petrarca" (see Fig. 11).

Petrarca nor Hans Brosamer, both represented in the *Physickbook*, are possible choices. On the other hand, neither the style of the woodcut nor a signature do point towards a definite artist.

The discovery of another, so far unknown, anonymous woodcut, which shows the same style and motive as the one of the *Zene Arznei* of 1530 and its copies, does not disperse the mystery that surrounds the name of our artist, but the artistic relationship of both dental woodcuts is so close that they can both be attributed to the same master who created them almost as counterparts.

Strangely enough, this dental woodcut (Fig. 14) is also not found in a dental book, but on the title page of a German edition of Lanfranci, to the contents of which it has hardly any relation. This is the same work of Lanfranci on the title page of which much later — in 1555, 1556, 1565 — the printer Daubman put the dental scene from the *Zene Arznei* of 1530.

[32] Marked in fig. 11 through lines.

I learned about this woodcut, equally interesting from the point of view of art history, culture history, and bibliography, through an article of the pharmacologist Emil Starkenstein, formerly in Prague.[33] This illustrated article deals with the most important pieces of the famous medico-historical book collection of the Swedish physician Dr. Erik Waller in Lidköping. This collection contains the only copy so far known of this edition of

Vorrede an den kunſtliebenden vnd verſtendigen Leſer.

Günſtiger kunſtliebender Leſer / demnach meine Vorältern (welche ein ſonderliches gefallen vnd beliebẽ zu der kunſt des Reiſſens vnnd Malens getragen / wie dann die vielen in holtzgeſchnietzte künſtliche ſtück ſo ſie hinderlaſſen vnd ich von jhnen ererbet / außweiſen vnd genugſam bezeugen) groſſen vleiß vnnd mühe angewendet / damit ſie ſolche von vortrefflichen vnd hochberümpten Reißern möchten machen laſſen vnd zuwegen bringen. Weiln ich dann / wie vermeldet / deren ſehr viel beyſammen hab / vnd etliche künſtler / vortreffliche maler vnnd kunſtverſtändige / ſolche bey mir geſehen / ich auch eben im werck war deß Hochgelerten vnd Weitberümpten Oratoris vnd Poeten Francisci Petrarchæ Buch / welches er Troſtſpiegel im glück vnd vnglück / tituluret (demnach die vorige getruckte Exemplaria / aller abgangen vnnd verkaufft waren) wiederumb von newem auffzulegen vnd zutrucken / darinnen dann vber die maſſen viel ſchöner Figuren gehören vnd kommmen / welche ein Vortrefflicher vnnd Hochberümpter Meiſter (wiewol ohne ſeinen darbey geſetzten nam̃en) geriſſen vnd geſchnitten / daß er auch dem Dürer wol zuvergleichen / wer er aber eigentlich ſey / kan man nicht gewiß wiſſen / doch er ſey gleich wer er wölle / ſo iſt daran nicht ſehr viel gelegen / dann das werck lobet ſeinen Meiſter: Als haben / vorangeregte künſtler bey mir angehalten vnd gebetten / daß ich ſolche künſtliche Figuren abſonderlich / allein mit einem Lateiniſchen Diſtichon / vnd den zweyẽ Teutſchen Verſen / wie ſolche im Petrarcha auch zu finden / damit man den inhalt einer

K ij jedern

FIG. 13. Preface of the Book (Fig. 12) in which the Identity of the Artist of the Woodcut is Questioned.

Lanfranci's *Useful Book on Wound Treatment* with its dental woodcut on the title page.

Through the great kindness of Dr. Erik Waller, to whom I wish to express here my particular gratitude, I obtained a photocopy of this unique edition, the title of which is:

Eyn nutzlichs wundartz / ney buchlyn des hochberumbten Lan / franci, ausz furbit des wolferfarnen Mey- / ster Gregorij Fleugausz, Chyrurgen / vñ Wundartzt zů Straszburg. / Dabey viler bewerter Recepten, heyl- / samer salben vñ ertzneyen, ein auszzůg, biszher / von obgenantem M. Grego. fur sich selbst / yñ grossem werd behaltẽ, ytzt gemei / nẽ nutz zů gůt auch jñ truck gebẽ. / Durch Othonẽ Brunfels verdeuscht /

The colophon on Fol. [D_8^r] (Fig. 15) says: Gedruckt tzů Cöllen vur S. Lupus. (printed at Cologne before S. Lupus). On the title page of the

[33] Starkenstein, E.: Der Arzt und sein Buch. Dem Arzte und Bücherfreunde Dr. Erik Waller. In *Philobiblon* (Ed. Herbert Reichner, Vienna) Vol. 10, No. 7, p. 318, Brünn 1938.

booklet that was bought from the library of Dr. Nyterhoeven in Brugge, the names of former possessors *van Heurne* and *J. Sterthem* are inscribed. The 32 sheets, 140:90 mm, are not numbered; collation A–D_8, the last sheet is without print. The printer is not "S. Lupus," as Starkenstein supposes erroneously, but the printer Arnt van Aich of Cologne. Arnt, like later his son John, signed his prints "vor sent Lup," "vur Sant

Eyn nutzliche wundartz
ney Buchlyn des hochberumbten Lan
franci/ auß fur bit des welerfarnen Mey-
ſter Gregorij Fleugauß/ Chyrurgen
vñ Wundartzt zů Straßburg.
Dabey viler bewerter Recepten/ heyl
ſamer ſalben vñ ertzneyen/ein außzůg/ biß her
von obgenantem M. Grego. für ſich ſelbſt
yñ groſſem werd behalte/ yetzt gemei
ne nutzzů gůt auch) yñ truck gebe.
Durch Othonē Brunfels verdeutſcht.

FIG. 14. Title Page of the Edition Arnt van Aich, Cöln. Without Year.

Lupus," "bey Sant Lupus," "by Sant Lupus," and "bei S. Lupus." "S. Lupus" is not a name of a person, the printer, but of a locality.

Though the Cologne edition of Lanfranci bears no date, this can be stated almost exactly, as the earliest and latest possible dates of its publication can be fixed. It is known that the last book published by Arnt van Aich was printed in 1530.[34] This edition of Lanfranci can therefore not

[34] Heitz, Paul and Zaretzky, Otto: *Die Kölner Büchermarken bis Anfang des XVII. Jahrhunderts.* Strassburg 1898. p. XXIII: "The few known and very rare books from the press of Arnd van Aich (Aachen) bear imprints between the years 1514 and 1530. Three give his full name, while the others give only the address "vur sent Lupus" or "by sent Lupus." His fifth child was Johannes who is known to have worked as a printer in 1539, 1543 and 1546."

Zaretzky, Otto: *Die Kölner Bücher-Illustration im XV. und XVI. Jahrhundert.* In: *Zeitschrift für Bücherfreunde* 3 (1899/1900) pp. 129–146. Voullième, Ernst: *Die Typen der Kölner Buchdrucker.* Halle a. S. 1912. Veröffentl. der Ges. f. Typenkunde des XV. Jahrhunderts VI, l. 2.

have been issued *after* this date. On the other hand, the German version of Lanfranci by Otho Brunfels cannot have been published *before* August 12, 1528. Brunfels' dedication to "the most famous master of surgery Gregorio Fleugaus of Strassburg" whom he acknowledges as the inspirer of this work, bears the date "Strassburg, den 12. tag Augsmonats, des 1528 Jares." It is thus certain that this edition of Lanfranci was printed between August 12,

blůt / yedes .ß. lot / Terpentin / Bolum armenum. Wachs / yedes .viß. lot / Baumöl ein lb. Was zů-stossen ist das stoß kleyn / Darnach nym das öl vnd das vnßlet vnd wachs / laß es senfftz er flies-sen. Darnach thů das hech vnd Terpentin darunter. Darnach das blůt / vnd zům le tzten die gestossenen Gummn / Rue es also wol vntereinander / biß es ein rechte dicke hat / wie mann sonst andern pflaster thůt.

Ende

Außlegung der verlatein ten vnd frembden wörter.

Abstergiern abtrucken.
Accidens zůfal.
Apostemirn schweren.
Curiern heylen.
Cicatrisiern vergentzen.
Confortiern sterecken.
Coliern seigen.
Consolidiern gantz machen.
Cellurum augen salb.

Compositum zůsamen gethan.
Cauterizieren brennen.
Confirmgiern stopffen.
Corredirn erzen.
Diet regiment.
Euacuern auß reynigen.
Embrocieren reuchen oben ab.
Fomentirn been vnten auff.
Ventersen schreff hörnleyn.
Incarnieren zů fleisch bringen.
Mundificirn reinigen.
Maturirn zeitigen.
Opulieren stopffen.
Pulueriſiern puluern.
Procedirn fur faren.
Principia anfang.
Patient siech / Franck.
Putrificiern feulen.
Repercutirn hinder schlagen.
Resolnern zerlassen.
Simplicia einfachen.
Suppositoria arßzapffen.
Trocisci sind kuchleyn.
Temperiern ein machen.
Vngent salb.

Finis.

Gedruckt zů Cöllen vur S. Lupus.

Fig. 15. Fol. 31^{v} and 32^{r} [Colophon] of the Edition Arnt van Aich, Cöln. Without Year.

1528 and 1530. The dental woodcut of the title page originated thus either simultaneously with the dental picture of the *Zene Arznei* of 1530, or even one of two years before. *In this case the dental picture of the Lanfranci edition could be claimed as the very first dental woodcut.*

Like the woodcut of the *Zene Arznei* this picture shows the dentist in the exercise of his profession, extracting teeth. While in the *Zene Arznei* he operates with long, slender pincers, the position of his fingers and hands in this scene shows a lever to be his instrument. In both pictures the slightly bent position of the operator, standing sidewise and behind the patient, which is typical for a mandibular extraction, is excellently observed. Likewise, the contracted attitude of the patient who is obliged to undergo the operation. The great similarity of the simple room with its scanty furniture on both sheets, is striking. The inventory consists on both pictures of a high door, a heavy wooden ceiling, a long bench at the back

wall, a shelf with jars and bottles above the windows, a brush hanging from the wall, and a heavy operation chair.

Identical also are the stroke and the shadowing. Most convincing is the absolute identity of form, position, and clothing of the right leg of the dentist. The similarities of the content and the style of both pictures do not leave any doubt that the same, so far still anonymous artist, who perhaps would be called best "the master of the Zene Arznei," created these two first dental woodcuts.

Bernardino Montana de Monserrate

AUTHOR OF THE FIRST ANATOMY IN THE SPANISH LANGUAGE; ITS RELATIONSHIP TO DE MONDEVILLE, VICARY, VESALIUS, THE ENGLISH GEMINUS, AND THE HISTORY OF THE CIRCULATION

J. B. De C. M. SAUNDERS, AND
CHARLES DONALD O'MALLEY*

BERNARDINO Montaña de Monserrate, although one may search in vain for his name in the standard histories of medicine, is worthy of recognition if only as the author of the first text on anatomy to be published in the Spanish vernacular. His work however, proves to be of still greater interest in the important relationships which it bears to the anatomical tradition of Henri de Mondeville as seen in the first English anatomy of Thomas Vicary, and because of its extraordinary parallelism to the Nicholas Udall version of the *Compendium* of Geminus and the plagiarism of the illustrations from the masterpiece of Andreas Vesalius.

The first work on anatomy published in Spain seems to have been that of Petrus Gimenus, now excessively rare, entitled *Dialogus de re medica compendiaria ratione, praeter quaedam alia, universam anatomen humani corporis perstringens, summe necessarius omnibus medicinae candidatis. Auctore Petro Gimeno, medico professore valentino. Valentiae per Joannem Mey Flandrum.* 1549. A student and assistant of Vesalius at Padua and later forming with Luis Collado an important part in the circle of Vesalius' disciples at Valencia, it is not surprising that Gimeno owes much to the author of the *Fabrica.*

While Gimeno's work may claim importance by reason of its priority, yet the second work on the subject of anatomy to be published in Spain, similarly rare and little known, has an even greater claim for recognition. This work of Montaña, possesses the imposing and most descriptive title: *Libro de la Anothomia del hombre. Neuamente compuesto por el Doctor Bernardino Montaña de Monserrate Medico de su Magestad. Muy vtil y necessario*

* From the Department of Medical History and Bibliography, and Department of Anatomy, University of California, San Francisco, California.

a los medicos y cirujanos que quieren ser perfectos en su arte, y apazible a los otros hombres discretos que huelgan de saber los secretos de naturaleza. En el qual libro se trata de la fabrica y compostura del hombre, y de la manera como se engendra y nasce, y de las causas porque necessariamente muere. Juntamente con vna declaracion de vn sueño que somno el Illustrissimo señor don Luys Hurtado de Mendoça de Mondejar, etc. Que esta puesta por remate deste libro. El qual sueño, debaxo de vna figura muy graciosa, trata breuemente la dicha fabrica del hombre, con todo lo demas que en este libro se contiene. Dirigido al dicho señor Marques . . . Valladolid . . . Sebastian Martinez. Año de 1551.[1] Surmounted by the arms, presumably of his patron the Marques, the partially rubricated title page is an attractive feature of the book.

But first of all what can be learnt of our author? Very little is known of the life of Bernardino Montaña of Monserrate, and we depend almost exclusively on the few scattered references of a biographical nature found here and there in his book. He was born at a time unknown, but from internal evidence almost certainly around the eighth decade of the fifteenth century. His place of birth was evidently the small hamlet of Monserrate near Barcelona, where overhanging the vast fissure of the Valle Malo lies the very ancient Benedictine monastery and where among the lofty spires of the sacred mountain mediaeval legend placed the castle of the Holy Grail: and here too it was that Ignatius Loyola kept knightly vigil at the altar of the monastery's chapel before dedicating himself as a leader of spiritual warriors. A Catalan Bernardino undoubtedly was, and Felix Torres y Amat rightly includes him among the materials of his critical dictionary of Catalonian writers. According to Morejon, he lived for a long period in Valladolid, and it was in this city that his daughter married the celebrated professor and lawyer Don Diego de Escobar. It was here that Bernardino gained a just and well-merited reputation which resulted in

[1] The *Anothomia* of Montaña is often stated, notably by Spanish authors, to have appeared in 1550, and the date of 1551 is considered as that of a second edition. Reference to the Privilege readily establishes that this cannot be so and that the first and so far as we know only edition is that given above. The error seems to have arisen from that of Nicolás Antonio or from Torres y Amat, who repeats the error from the former; thus also Haller [p. 199]; Chinchilla [p. 253]. As the work of Montaña has not been included in Cushing, the contents, collation and colophon which follow may be found useful by those desirous of adding this Vesalian item.

Colophon: Fue impresso en la insigne villa de / Valladolid en casa de Sebastia / Martinez a la perrochia d̄. / sant Andres. Acabose / a dos dias de no / biembre de. / 1551 //

Collation: Sm. fol. *8 A-R⁸, numbered by fol. to cxxxvi.

Contents: *1a Title page in red and black; *1b "El principe"; *2a–8b index & errata; Aa–A2a Epistola dedicatoria; A2b–A4b Prohemio; A5a–H8a The anatomy of man in xi chapters; H8a-K1b On generation, birth and the causes of death, in two chapters; K2a second title page to "Coloquio"; K2b–R1a The "Coloquio"; R1b–R7b The Anatomical plates; R8a "Gloria de Dios" and colophon; R8b blank.

his being called to the position of physician to the emperor Charles V.

Where Montaña studied medicine is unknown. However in his *Anothomia* he wrote that a surgeon who wished to be properly versed in his art "should go and take his training [i.e., in anatomy] at the universities" where dissections are performed on human bodies "as in France at Mont-

FIG. 1. Title page of the *Anothomia* of Montaña.

pellier, in Italy at Bologna, in Spain at Valladolid, where with the authority of His Majesty's council it has begun to be recently performed in public very skilfully by the Bachelor Rodriguez surgeon, a very excellent man and experienced in this art" [fol. 3r].

The authorities were never liberal in providing opportunities for dissection in Spain. John I in 1391 had granted the university at Lerida the right of dissecting every three years the body of a condemned criminal, and in 1488 Ferdinand permitted the practice at the Hospital of Saragossa, but there was little regular instruction. It is therefore remarkable, as Chinchilla observes, that Montaña fails to include that notable circle of Vesalius' disciples who made Valencia an outstanding centre for anatomical studies at this time. There may have existed a rivalry between the

schools of Valladolid and Valencia, perhaps stemming from the differences between Montpellier and Paris, since the former is mentioned but not the latter. Likewise we find Bologna praised, but the much more important school of Padua goes unrecognized. While willing, as we shall see, to use the Vesalian plates, without recognition be it noted, perhaps the omission of Padua and the name of the immortal anatomist is related to the envy which Jacobus Sylvius did so much to foment against the young "upstart" Vesalius among the older physicians of the court, to say nothing of Montaña's conscience which would scarcely be stirred by the crime of plagiarism in an age when the practice was regarded as of little moment.

Montaña's reference to these centres suggests that he must have studied outside of Spain, since he later remarks that he had been in practice for forty-five years at the time of writing his book [fol. 70r], and thus would have been unable to enjoy the teaching at Valladolid, only recently introduced. He writes in the *Anothomia* "in the same year of 1513, when directing my course toward Spain, I saw in Toulouse a knight with a hard tumour in the groin" [fol. 82r], and so it is probable that he was returning at this time to his native land after completing his medical education abroad, most likely at Montpellier. Morejon tells us that he was over seventy years of age at the time of publication of his work, which from the above seems a not unreasonable surmise. This then is the sum of our knowledge on the personal life of the patriarchal imperial physician.

Despite Montaña's advanced age at the time of writing the *Anothomia*, his interest in the study of anatomy was so great that he had himself carried in a litter, since the infirmities of age and gout would not permit travel on foot, to attend the lectures and demonstrations of Alfonso Rodriguez de Guevara, "the experienced surgeon" and professor of anatomy at Valladolid [Morejon, p. 355]. In the dedicatory letter addressed to Don Luis Hurtado de Mendoza, Marques de Mondejar, a member of His Majesty's councils of war and state and president of the council on the Indies, Montaña writes of the great importance of the study of anatomy which, he says, is like the alphabet whence those must begin who wish to be physicians [fol. 1v]. He continues by observing that "he takes a great pleasure in writing this book in the vernacular because many surgeons and other discreet men who do not know Latin, will profit from reading it, and because at this time physicians are so inclined to affecting the Latin idiom that they give all their thought to its employment in speech . . . and neglect the principal part which is doctrine, for which reason there are few

physicians who know medicine but many who write on the subject" [fol. 2r].

The adoption of the vernacular was of the greatest importance in the spread of scientific knowledge and was a trend which was beginning to sweep the whole of Europe in this century. This was a factor which must have contributed immeasurably to the improvement of standards among the apprentice surgeons, the great majority of whom could read no Latin. It was just such motives which led Geminus in England to arrange for a translation by Nicholas Udall of his plagiarised version of Vesalius so "that the same worke beeyng set foorth in the Englishe tounge might greatly availe to ye knowlage of the unlatined surgeons, & by meane of them, should bee muche more beneficiall, then in latin it is to an infinite nombre of people in thys your Maiesties Royalme of Englande" [*Compendium*, 1553, dedication].

The *Anothomia* of Montaña consists essentially of three parts. The first comprises the anatomy proper to which are appended two chapters, one of which deals with the generation and development of man and the other, with the causes which necessarily lead to death. The second part is a colloquy, the dream of the Marques de Mondejar, presented in the manner of a typical Renaissance dialogue between the Marques and Montaña on certain aspects of humoral physiology. And the final section is that devoted to the illustrations.

The anatomical section together with the dedicatory epistle, occupies some seventy-three folios. After the *proemium* in which the author exhorts the would-be surgeon to select for his training an institution where actual dissection of the human cadaver is performed, there follow three chapters of preliminary materials devoted to definitions, the simple and the compound members. Thereafter the rest of the anatomy of the body is treated successively in chapters four to twelve in the following order: the cranial cavity and contents, the vertebral column, the facial region, the neck, the upper extremities, the thorax, the abdomen, the organs of generation, and finally the lower extremities. One immediately recognises in the arrangement from head to foot, the scholastic order so popular in mediaeval texts and found in the anatomical treatise of the great French surgeon, Henri de Mondeville (1260–1320). On closer analysis the text of Montaña's work proves to be without a doubt derived from this celebrated pupil of Theodoric, who was so influential in the famous school of surgery at Montpellier. There is some rearrangement and simplification together with a

few corrections which suggest a first hand acquaintance with the appearances of the viscera, but essentially we have here a continuation of the long tradition of de Mondeville. The version is much closer to the original de Mondeville than to that by way of the *Chirurgia magna* of Guy de Chauliac which Montaña, although acquainted with the work, no doubt found too abbreviated. In this connection it should be noted in passing that Chinchilla [p. 255n.] would make Montaña the author of a treatise on surgery. This is, however, the result of a hasty and incorrect reading of a passage [fol. 18v] in which Montaña suggests that sufficient information concerning wounds of the scalp can be found, not in his book as Chinchilla misread, but *en la cirugia de guido* (i.e., Guy de Chauliac).

The *Anatomy* of de Mondeville, part of the common tradition of mediaeval anatomy drawn from Arabian sources, and from Avicenna in particular, was very popular, and translations in almost all tongues circulated widely in manuscript form throughout Europe. It was J. F. Payne who, in an excellent study later confirmed by S. V. Larkey, established by finding a fourteenth century manuscript that the famous work of Thomas Vicary (ob. 1561), Searjeant-surgeon to Henry VIII, was based in large measure on Henry de Mondeville. Vicary's text, *A profitable treatise on the anatomie of mans bodie*, was published in London in 1548, but of this first edition no copies are extant today. A second edition was published in 1577, and the work has enjoyed a well-merited reputation for its influence on the education of the barber-surgeon and is recognised as the first book devoted to anatomy to be printed in England. Montaña's *Anothomia* is consequently almost an exact parallel since it was derived from the same source and was the first work exclusively concerned with anatomy to be published in the Spanish tongue. But, as will be discussed later, a still more interesting parallel will be disclosed in the relationship of Montaña's work to the Vesalian illustrations. Before discussing this feature, however, it is desirable to examine other aspects of the text.

One of the notable features of Montaña's text is its great clarity. In order to show his method of handling the subject and how closely he has followed the original, the following single passage, fairly typical, should not be without interest. The passage chosen is the same as that selected by Larkey and therefore will enable the reader to compare, if he so desire, the versions of the Payne Ms., now unfortunately lost, the Peterhouse, Cambridge, Ms. 118, and the Udall, given by the above-mentioned author. In parallel columns are placed the Latin text collated by Julius Pagel from the various codices and that published by Vicary.

DE MONDEVILLE

Cartilago est membrum consimile simplex pure spermaticum, proximum in duritie ipsi ossi, frigidum et siccum complexione, insensibile et flexibile [1487: quandoque]. Utilitates creationis cartilaginis in corpore 6 fuerunt: (1) ut continuatio ossis duri cum membris mollibus non fieret absque medio mediocri: (2) ne hora concussionis et compressionis a membris duris membra mollia lederentur: (3) ut extremitates ossium juncturarum quae sunt cartilaginosae, molliter ad invicem confricentur: (4) quia necessarium erat, alicubi infigere aliquid in membro mediocriter duro sicut in ipigloto cartilaginem cymbalarem: (5) quia necessarium est aliqua membra sustentari, plicari et ampliari, ut nares, aures, etc., quae omnia non possent [1487: possunt] fieri in eodem nisi cartilagine mediante: (6) ut cartilago suppleat ossis officium sustinendo aliquos musculos moventes aliqua membra, sicut est in palpebra superiori.

VICARY (1577)

The Grystle is a member simple and spermaticke, next in hardnes to the bone, and is of complexion colde and dry, and insencible. The grystle was ordeyned for sixe causes or profites that I fynd in it: The first is, that the continual mouing of the hard bone might not be done in a juncture, but that the grystle should be a meane betweene the Lygament and him: The seconde is, that in the time of concussion or oppression, the soft members or limmes should not be hurt of the harde: The thirde is, that the extremitie of bones and Ioyntes that be grystly, might the easelyer be folded and moued together without hurt: The fourth is, for that it is necessary in some meane places to put a grystle, as in the throte bowel for the sounde: The fifth is, for that it is needefull that some members be holden vp with a grystle, as the liddes of the eyes: The sixth is, that some limmes haue a susteyning and a drawing abrade, as in the nose and the eares, &c.

MONTAÑA

Cartilagen que en romance solemos dezir ternilla, es un miembro simple seminal mas duro que ligamento menos duro que huesso, sirve esta ternilla en el cuerpo de tres cosas, es a saber. La una para el movimiento de algunos miembros, en los quales no vuo lugar de ponerse huesso, por ser miembros delicados: como en los parpados de los ojos, los quales por ser ligeros basta les para su movimiento una ternilla a donde sus musculos se ingieren: y de mas desto el ojo no sufre la pesadumbre del huesso. La segunda cosa de que sirven las ternillas, es juntar un huesso con otro, porque lo duro con lo duro es dificultoso de juntarse, si no es mediante otra cosa media y mas blanda, como es la ternilla: y esto se haze en algunas cabeças de huessos que como avemos dicho son postizas y se juntan con sus huessos mediante la ternilla. La tercera cosa de que sirven es, de mediar entre los huessos de la juntura nudosa, quando tiene movimiento recio, para que un huesso no se fregue con el otro, porque con su dureça se harian perjuycio, como paresce en la juntura de la rodilla. Otros puechos tienen las ternillas tambien en el cuerpo, de los quales trataremos en el anothomia particular de los miembros compuestos.

Su complexion de la ternilla es fria y seca, algo menos quel huesso y mas quel ligamento [fol. 11r–v].

The second part of the anatomical treatise is divided, as mentioned above, into two chapters which treat of generation, development of the foetus, birth and the causes which necessarily lead to death. The principal agent of generation, says Montaña, is arterial blood, which is elaborated and prepared in the testes to be converted into semen. Blood, he continues, is either venal and therefore gross, earthy and impure; or arterial, a purified and subtle form of the former. The purification and conversion of venous into arterial blood is carried on through the medium "of the pores of the substance of the heart" [fol. 64v.]. This arterial blood prepared by the testes and converted into semen, when mixed with arterial blood is the basis of generation. The process of development then proceeds owing to a sort of selective fermentation which thus engenders the natural heat. Thereafter he continues with a discussion of the foetal membranes, the umbilical chord and the placenta, the successive development of the foetus, and the mechanism of its formation with a consideration of the true termination of conception. The function of living substances is compared to that of plants, and he believes that the womb, like the earth, is the portion which sustains the foetus and the placenta is like the roots which take the necessary nourishment from it. These conclusions, he informs us, are the result of forty-five years of experience, and he asks pardon of the shades of Hippocrates, Aristotle, Galen and Avicenna because he does not follow their teaching in this regard. Existing texts he finds corrupted and contradictory, and he frequently is faced by problems in his practice which are not discussed in the books, or he meets with statements which do not correspond to his experiences.

The second chapter of the above section treats of the necessary causes of death. Life is defined as the natural potency, or the sum of the potencies of the individual parts, possessed by man through which he exercises natural functions and especially those which pertain to the vegetative processes. Death is then the deprivation of the same potency in such manner that it is impossible to regain it. The fundamental base of the natural vegetative potency is the heat which is an accompaniment of the vital spirit, engendered by the more subtle portion of the arterial blood, which is a very ethereal and hot substance of the nature of fire. Death then, is either natural or accidental. The former cannot be avoided because it depends on the successive extinction of all the natural functions, but the latter may be avoided by remedies of the art.

The section on embryology and the mechanism of developmental processes, especially the conception of fermentation as a major factor in the

formation of the natural heat and in the elaboration of the various organs of the body, is quite unique. However, we immediately recognise, despite Montaña's protestations, the fusion of Aristotelian and Galenical ideas and therefore suspect that he is for the most part dependent on Arabian sources. His indebtedness is notably evident in his use of anatomical terminology, and we often meet with such terms as *mirach* for the anterior abdominal wall and *siphac* for the peritoneum.

The dream of the Marques de Mondejar bears the title *Sigue se un coloquio del illustrissimo senor don Luys hurtado de Mendoca Marques de Mondejar, etc. con el doctor Bernardino Montana de Monserrate medico de su Magestad. Acerca del dicho sueno que sono su senoria. Be* [sic] *la generacion nascimiento y muerte del hombre.* The separate title page is a highly ornamental woodcut, and appropriately illustrates the Almighty on the judgment seat surmounted by two cherubim carrying a scroll in which we are exhorted to "arise from death and come to judgment." Below this are the figures of faith, hope and charity, with the motto "the greatest of these is charity." At the foot, figures support a cartouche carrying the entwined initials S M, for the printer Sebastian Martinez. The colloquy is not quite so long as the anatomical section and runs to some fifty-five folios.

The "dream" is a typical Renaissance dialogue in which the interlocutors are the patron, the Marques de Mondejar, and his physician, Montaña, but it scarcely attains that animation and liveliness which we associate with the best examples of this popular sixteenth century pattern of expression. It is in fact, a work on physiology in which the principal functions of human organisation are presented in allegory. Since it contains but a modified account of Galenical notions, the colloquy would deserve but little consideration were it not that when taken in conjunction with the views expressed in the anatomical section proper, Spanish historians of medicine find opinions which they believe entitle the author to be regarded as a precursor of William Harvey, and by some as the actual discoverer of both the pulmonary and general circulation. Of this curious nationalistic movement started by the Benedictine friar Benito Jeronimo Feijóo (1676–1764), with Francisco de la Reina (fl. 1564) as the candidate for the honour, the reader will find an excellent critical summary given by Izquierdo, the author of the first Spanish translation of the *De motu cordis*. Nonetheless the account of Montaña is in some respects quite novel, and we therefore give in fairly literal translation several excerpts:

The right ventricle serves to receive blood which comes from the liver in the first instance, to concoct (*cocer*) it and prepare it for the left ventricle.

The left ventricle serves to purify the said blood which comes to the right ventricle and to attenuate it and make the blood arterial, by means of which, as we have seen before, the solid members of the body are maintained. So also the vital spirits of the arterial blood are engendered in the aforesaid ventricle and from there go forth with the blood to the whole body.

The pathway by which this blood of one ventricle passes to the other, is of the same substance as the heart, by means of pores which establish the said pathway. [Cf. the passage previously quoted from fol. 64].

In each of these ventricles there are two openings. Through one of the openings of the right ventricle [tricuspid orifice] enters the blood which comes from the liver to the said ventricle by means of the vena cava which joins with the heart in the said opening. From the other opening runs a vein from the heart which we call the *vena arterial* [pulmonary artery], because it is quite like a vein [i.e., pulseless] and has two coverings like an artery. This vein goes to the lungs and distributes itself through their substance so that the fleshy part of the said lungs is maintained by that blood which the heart sends to it by the said vein.

Through an opening in the left ventricle [mitral orifice] enters the venal artery [left atrium and pulmonary veins] by which the cool air [fol. 47r]//of the lungs enters the heart in order to chill it. The heart also sends by the said artery, arterial blood and vital spirits for the maintenance of the solid parts of the lung. From the other opening runs the great artery which we call the *adorti* [aorta], which distributes the attenuated blood and vital spirits to the whole body.

Here is to be noted a secret of nature, that in these openings it places doors which are closed and opened according as it suits each for its office. Thus in the opening of the vena cava [tricuspid orifice] it places three little doors (*portecicas*) made from a membrane, which it causes to open inward and to close outward, so that when the ventricle is dilated, the said doors are opened to give passage for the entrance of the blood; and the opposite, when the heart is contracted, the said doors are closed so that the blood is unable to return to the said vein.

The opening of the arterial vein [pulmonary artery] has three other doors that are opened inward and closed outward, so that when the heart is contracted, the doors are open and when it is dilated, they are closed. Thus in contraction, the vein [pulmonary artery] receives the said blood of the heart, and when it is dilated, the said blood is unable to return to the heart.

In very similar manner the opening of the left ventricle from which runs the great artery, has three other doors for the same purpose, that they may open outward and close inward. But the opening [mitral orifice] through which runs the venal artery has no more than two doors, poorly joined, through which enters the cool air which runs forth when it is heated. The arterial blood also runs through the said opening together with the vital spirits which the heart sends to the lungs for their maintenance [fol. 47v]

. . . . . .

In the outward part, the heart has two auricles (*orejas*) which correspond, one to the right ventricle, the other to the left. Of these auricles that which is related to the right ventricle, according to the common opinion of physicians, serves to

hold in deposit a notable quantity of venous blood, and that of the left ventricle serves to hold also in deposit a certain quantity of air.

The necessity of the auricles was that with the force of the movement of the heart and with the combination of the blood and cool air, owing to its power and heat, the vessels in which this combination is made, might not be broken. Since the vessels are so small, if the air and blood were not held in deposit in the said auricles, the combination being so strong, neither the vena cava nor the venal artery [left atrium and pulmonary veins] would be able to deliver enough quantity of blood and air when it is required, and the said vessels would run the danger of rupturing.

However, it appears to me that the said auricles serve principally to hold in deposit the quantity of blood which is necessary to the heart without which life could not be maintained.

To understand this, one must know that when the heart is contracted, the ventricles discharge the entire quantity of blood which they contain, and with it the vital spirits, and thus little or no blood remains in the said ventricles.

In addition, it must be considered that for the conservation of life it is necessary that there is always a certain quantity of blood in the heart, arterial as well as venous, without which the natural heat of the heart cannot be conserved, and in consequence the life of the whole body perishes.

Then I say that the said auricles serve principally to keep guard, each one of them, of the blood of which the heart has need, by the one ventricle and by the other, so that though the heart is contracted and expells the blood that is in the ventricles, the quantity of blood of which the heart has need yet remains in the auricles. And this is a very notable assistance, because through experience we see that both the said auricles swell up with blood [fol. 48r]//when the heart is contracted, and when the heart is dilated, the auricles return the said blood to the ventricles; from which it clearly appears that the said auricles are the measure of the blood of which the heart has need in each one of its ventricles [fol. 48v].

. . . . . .
. . . . . .

The utility of the heart, as we have said, is principally that the blood which goes to it from the liver is changed into arterial blood, and in this arterial blood is engendered the vital spirits. For this reason there is necessity for the two ventricles, the right to receive the blood from the liver by means of the vena cava, and in the left to make the arterial blood, and from the arterial blood the vital spirits.

In the same manner the heart serves to send the arterial blood and the vital spirits to all parts of the body for the conservation of the natural heat of each one which exists because of the vital spirits, and for the maintenance of the solid members which are nourished by the arterial blood. For this office there is need of the great artery by means of the branches of which is distributed to almost all the body the arterial blood and the spirits which accompany it.

Moreover, there is need for the heart to send nourishment to the sanguinous parts of the lungs which are maintained by the heavy part which remains behind with the blood of the right ventricle and is derived from the arterial blood which

passes to the left ventricle. For the above office the arterial vein [pulmonary artery] is necessary, which runs from the right ventricle of the heart and is distributed through the substance of the lungs.

It is also necessary for the heart to send vital spirits to the lungs to provide them with natural heat and [fol. 49r]//life, and it is likewise necessary to send arterial blood for the nourishment of their solid parts.

The venal artery [left atrium and pulmonary veins] which runs from the left ventricle of the heart, serves this office. It is distributed through the substance of the lungs like the arterial vein [pulmonary artery] which we have mentioned.

And here we must consider what has been said, that the heart is necessary to send vital spirits and the two kinds of blood to the lungs. Although this is a necessary assistance for the conservation of the lungs, it finally results in great benefit to the heart because the said lungs are so necessary to the heart, for if they fail it but a moment, life perishes. For this reason we have said that the heart in its own interest supplies the lungs with all that is necessary to conserve them.

Likewise, we must here recall what we have said many times, that the heart has need of cooling itself continuously by means of the cool air which it draws from the lungs. In the same way it has the necessity of discharging from itself the air, when it is warm, and the bad humours which arise from the blood. All this is done by means of the said venal artery [left atrium and pulmonary veins], so that the said venal artery serves as a pathway through which the heart introduces the cool air from the lungs to the ventricles, especially to the left in which the heat is greater. Similarly, the heart sends to the lungs through this vessel the air when it becomes warm, and the bad humours which accompany the said air. In addition the said venal artery serves as a way through which the heart sends the arterial blood and vital spirits to the lungs, as we have said previously.

For all these works the heart has the necessity of moving itself perpetually, dilating and compressing its ventricles, by means of which movement it performs the greater part of its offices. By its dilation it draws the venous blood from the vena cava to the right ventricle, and by the same motion it draws through the venal artery [left atrium and pulmonary veins] cool and clean air from the lungs to the left ventricle. By its contraction it sends the arterial blood and the spirits through the great artery to all the body. In the same way, by means of the said contraction, it ejects from itself [fol. 49v.]//the air, when it becomes warm, and the bad humours which accompany the air. The said contraction expells into the lungs the blood which remains in the right ventricle after the extraction of the arterial blood, which, as we have said, is the proper nourishment of the flesh of the lungs.

So then, the principal work of the heart, for which it undertakes other works and offices, is the said movement of dilation and contraction of its ventricles. [fol. 50r]

The Marques de Mondejar then enquires if, when the heart is dilated, do the arteries dilate, and when the heart is contracted, are the arteries contracted. To which Montaña replies, "In a healthy man who has no de-

fect in his natural composition, all wise and ancient doctors agree that at the same time as the heart is dilated, all the arteries are contracted, and when the heart is contracted, all the arteries are dilated, and thus when the heart is quiet, so the arteries are at rest" [fol. 94r]. This statement of Montaña's is most interesting since it attacks one of the most solid dogmata of the Galenical physiology. The important observation that cardiac systole is synchronous with arterial expansion is ascribed by Singer [p. 142] to Realdus Columbus (1516?–1559) whose *De re anatomica* appeared at Venice in 1559, shortly after his death. But the observation is original with neither Montaña nor Columbus. It was first put forward, but with considerable hesitation, by Vesalius in his revision of John Guinther of Andernach's *Institutiones anatomicae*, Venice, 1538, and again, following further animal experiments, more emphatically in the *Venesection letter* of 1539 [p. 63 ff.]. The wording of Montaña's discussion suggests that his opinions are derived from the latter source.

Finally, having indulged in a great deal of repetition to make his points clear to the Marques, we find Montaña replying to the question "Do you know whether the movements of dilation and contraction are involuntary or voluntary?" In the following manner:

> The movement of the heart can in no way be voluntary because there is no muscle, the sole instrument of motion, to move it. Since this is so, such motion as the heart possesses is involuntary, that is, involuntary motion through itself. You must understand a motion which is not voluntary, for by a voluntary motion is meant a motion which follows the order of the will. [fol. 91v]

He continues in explanation of the source of cardiac control:

> Thus I say that the movement of the heart is involuntary, notwithstanding that it is composed of two contrary motions [systole and diastole]. Nonetheless, the said motion is controlled by a single intelligence acting intrinsically, which understands the purpose of its movement and the manner in which it must move to conform to that purpose [fol. 92r].

From the above excerpts it is more than clear that Montaña knew nothing of the circulation of the blood as conceived and demonstrated by William Harvey. It is equally clear that his opinions diverge somewhat from the "ebb and flow" theory of Galen. It would seem that the views expressed on the cardiac cycle are based upon observations of the living animal. For in discussing the function of the auricles he states the traditional Galenical view that the right contains blood and the left air, but he continues with his own opinions which, apart from the use of the word "ex-

perience," meaning in that period usually "experiment," strongly suggest that he had witnessed the pulsating heart.

It is to Montaña's credit that he grasped and expressed with clarity and brevity the function of the valves of the heart, even if, as is not unlikely, he had made a digest from Vesalius [*Fabrica*, VI: xv: 597], or perhaps from the *Commentaria* of Berengario da Carpi. The account given by Galen [*De usu partium*, VI: xiv] is anything but clear, and quite contradictory in some versions, and that of Mundinus [p. 83] a confused jumble. Despite his understanding of the one-way action of the cardiac valves and his acceptance of the correct relationship of systole and diastole to the pulse of the vessels, authority reasserts itself, and he needs must have the venous blood sweating through the mythical pores of the septum to the left ventricle. So too, although he breaks with tradition, since he allowed no backflow of blood through the tricuspid orifice into venous channels, he must find the mitral valves imperfect in their fit to permit leakage of arterial blood to the lungs and with it Galen's air and excrementious vapours.

His conceptions of the pulmonary phase are obviously pure Galenism, and we hear no echo of the views of his distinguished countryman, Michael Servetus, on a lesser circulation. But in this connection attention should be drawn to the most misleading statement among many of Chinchilla [p. 259], which creates the impression that Montaña did possess some understanding of the pulmonal passage. This author quotes Montaña as saying that "the generation of arterial from venous blood is carried on and purified through the pores of the lung" [fol. 64]. The passage, as correctly given above, reads not "lung" but "heart." Consequently we find Lejeune, one of the few non-Spanish writers to study Montaña, but depending on the excerpts in Chinchilla and Morejon, stating with reservations it is true, that our Spanish physician was "a sort of distant precursor of Servetus."

Chinchilla in justly disposing of the claims put forward by Morejon and numerous other Spanish authors on behalf of Francisco de la Reina, contends that this veterinarian of Zamora had read while living at Valladolid, Montaña's treatise and had incorporated views from this source in the compilation of his *Libro de albeyteria*, Burgos, 1564. Therefore it is to Montaña that Chinchilla would transfer the honour of the discovery of the circulation — as if it could be discovered and not demonstrated — and to substantiate his beliefs points to the significance of the illustrations of the arterial and venous systems found at the end of the book without recognising that these are put plagiarisms from Vesalius. Apparently ow-

ing to the scarcity of Montaña's work, the majority even of Spanish writers depends upon the passages transcribed by Morejon and Chinchilla. Both of these writers must be used with the greatest caution, and in the case of Chinchilla we find that his quotations are inexact and by omissions tend to present Montaña in too favourable a light. As Comenge, quoted by

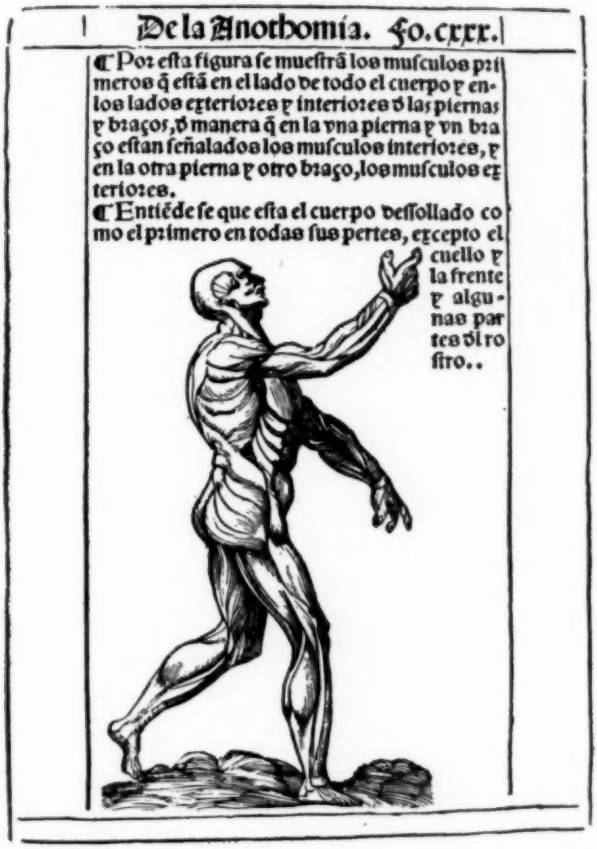

De la Anothomía. Fo. cxxx.
¶ Por esta figura se muestrã los musculos pri
meros q̃ estã en el lado de todo el cuerpo y en-
los lados exteriores y interiores ó las piernas
y braços, ó manera q̃ en la vna pierna y vn bra
ço estan señalados los musculos interiores, y
en la otra pierna y otro braço, los musculos ex
teriores.
¶ Entiẽde se que esta el cuerpo dessollado co
mo el primero en todas sus pertes, excepto el
cuello y
la frente
y algu-
nas par
tes ó lro
stro..

FIG. 2. The Muscleman in Lateral View Derived from Vesalius, *Fabrica* II, tab. 2.

Izquierdo [p. 241] says of the text given by Chinchilla, *deben descharse por haber sido de intento mutilados o corregidos.*

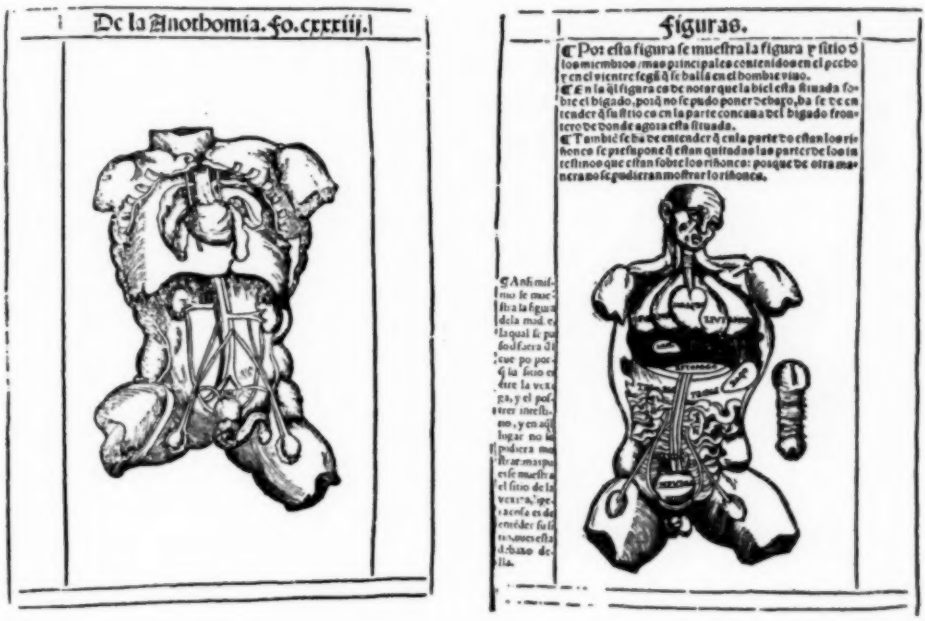
At the end of Montaña's volume we come to the illustrations, fifteen in all, which would seem but for the collation, to have been added as an after thought, since no mention of them is made in the text proper, nor are they indicated in the title page, the dedicatory letter or in the table of contents. We are simply told in the heading to this section that these figures will be found useful in following the author's discussion of the

anatomical structure of man. Apart from a very general statement in the caption briefly indicating what is portrayed, there is, with but a single exception, neither lettering nor legend.

It is not difficult to recognise that the great majority of the woodcuts are direct plagiarisms from the *Epitome* or the *Fabrica* of Andreas Vesalius. First come three musclemen in anterior, lateral and posterior views, derived respectively from the third, second and ninth muscle tables of the second book of the *Fabrica*. In each case the figure is reduced very appreciably, modified to the extent of omitting the background and reversed. Nonetheless the reproductions are clear and fairly creditably executed. The captions will be found to be but a brief paraphrase of those given by Vesalius. These are followed by two tables representing the venous and arterial systems, the former taken from the third book of the *Fabrica* [p. 268 (for 368)], and the latter, a modification of that in the *Epitome*. Then we find, in striking contrast to the other illustrations, a debased and crude drawing of the peripheral nervous system, obviously executed by a different and far less skilled hand, but which may have been intended as a copy of the large table inserted at the end of the fourth book of the *Fabrica*. The genito-urinary system receives attention with a figure derived from the fifth book [fig. 22, p. 372], to which the artist has added the thoracic contents. The next illustration is a crude semi-diagrammatic representation of the contents of the thorax and abdomen, and is the only one to bear legends naming the various organs. We assume that it is an original, and if it is to be granted any merit, then solely because the liver is shown without its traditional Galenical lobes. As an inset, is a poor reproduction of the picture of the vagina and uterus which Vesalius tells us with great glee he stole from the body of a "handsome whore." [*Fabrica*, V, fig. 27, p. 381]. The central nervous system is represented by a plagiarism of Vesalius' illustration of the brain and the cranial nerves from the fifth book of the *Fabrica* [fig. 2, p. 319]. Finally the skeletal parts receive treatment by means of three plates. The first is a reversed copy of the anterior view of the skeleton which forms the first table of the Vesalian series of book one. The second is an extremely crude drawing of the posterior view of the skeleton supported by a scythe. Like that showing the viscera, the cut is by a different hand, and in its crudities, lack of proportion and distortions has all the earmarks of being based on the skeletal figures of Berengario da Carpi (1470–1550). The third and last cut shows larger and more detailed figures of the bones of the hand and foot. The errors of arrangement in the carpal bones and other features indicate with

certainty that these too are plagiarisms but this time from the work of one also given to that practice, namely John Dryander (ob. 1560) who in turn derived them from Berengario da Carpi.

Juan Valverde di Hamusco, who studied anatomy at Padua and Rome under Realdus Columbus and Bartholommeo Eustacchi, is generally regarded as being the first to introduce the Vesalian illustrations to Spain

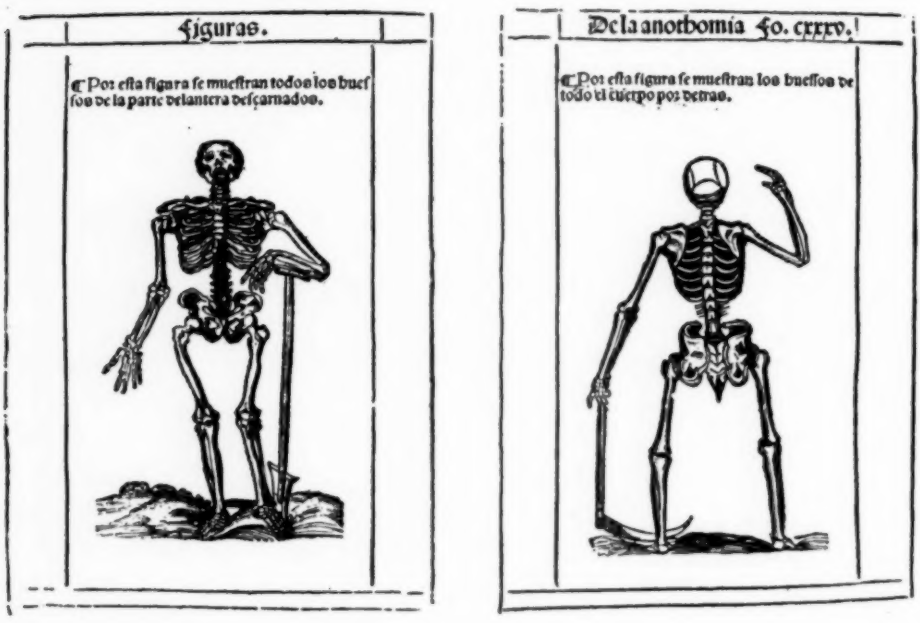


a *b*

FIG. 3. The Visceral Figures. *a*) Modified with additions from Vesalius, *Fabrica*, Lib. V, fig. 22. *b*) An original illustration with inset of female genitalia from Vesalius, *Fabrica* V, fig. 27.

coupled with a text in the vernacular. His work, *Historia de la composición del cuerpo humano*, was printed at Rome in 1556, but published for Antonio Salamanca and Antonio Lafrerii largely for distribution among the Spanish who "having few [bodies for dissection] come to Italy to learn" anatomy, and "partly because the surgeons (who unfortunately do not understand it) know little Latin, partly to ward off the grave; moreover, Vesalius did not see the need of undertaking such a task" [Dedication fol. ii r–v]. Although Valverde's text proved very popular and went through many editions in Italian, Latin and Dutch, the *editio princeps* was the only one to appear in the Spanish language. The Valverdian illustrations were drawn by the Spanish painter Gaspar Becerra and engraved on copper by Nicolas Beatrizet of Lorraine. The great majority are derived from Vesalius, but

many are curious debasements of the originals, some of the visceral plates being placed in armour, others falsified and yet others in striking poses, animated and amusing if awkward and bizarre. Vesalius, ever sensitive to the use or modification of his plate, bitterly resented, despite acknowledgement, Valverde's work which he regarded not only as a plagiarism but as of little worth, since he contended that the author had never dissected.


figuras.
Por esta figura se muestran todos los huesos de la parte delantera descarnados.
De la anotomia fo. cxxxv.
Por esta figura se muestran los huesos de todo el cuerpo por detras.

a *b*

FIG. 4. The Skeletal Figures — a contrast. *a*) Anterior view appearing on fol. 134 verso, derived from Vesalius, *Fabrica:* Lib. I, tab. 1. *b*) Based on Berengario da Carpi.

Montaña's reproductions cannot compare in detail and textural qualities with those obtained on copper by Valverde. They suffer greatly owing to the great reduction in size from the originals, and the technique of the cuts is of the simplest. The identity of the copyist or copyists must remain a mystery since there is neither engraver's mark nor initial. However, apart from the crude plates derived from Berengario da Carpi, the reproductions are not too discreditable a performance and compare favourably with the average run of similar work of the period. Roth [p. 226], the exhaustive biographer of Vesalius, is the only writer we have been able to find who has recognised the true source of these illustrations, but he erroneously believed that the text was a debased compilation from the *Fabrica.*

There can be but little doubt that the most influential part of Vesalius'

work in the general dissemination of the new knowledge was his illustrations. At the initial appearance of the *Fabrica*, and its companion the *Epitome*, his contemporaries were overwhelmed by their magnificence and while quickly recognising the superiority of the plates, which set a new standard, they as rapidly came to the conclusion that the text of the *Fabrica* was too difficult and unsuitable for the general student and that of the *Epitome*, too short. In the case of the *Fabrica* there were other considerations such as its apparent anti-Galenism and its cost. Miss Rostenberg has disclosed from her study of the printer Oporinus, that the *Fabrica* cost wholesale no less that five *gulden* three *batzen*, whereas a copy of Aristotle's *De arte dicendi* could be had for ten *batzen*, or of the *Old Testament* for twelve. Such motives undoubtedly influenced Montaña, for he tells us in the dedication that many have been kept from the study of anatomy because authors have written on it in such great volumes that life was hardly sufficient for man to read what is contained in them, a remark which might very readily have been directed against the vast bulk of the *Fabrica*. For this reason, he continues, his little book will be only a compendium, but nevertheless it will contain all that is necessary and fundamental [fol. IV].

The association of Vesalian illustrations with a text in a vernacular tongue based on de Mondeville brings to mind a similar co-incidental development which was to occur two years later in England. Larkey has established that the text of the English editions of the Geminus *Compendiosa*, 1553, 1559, long thought to be a translation of the *Epitome*, is in reality a rearrangement of that of Vicary, in turn derived from de Mondeville. The rearrangement followed the "order of an anatomy" introduced by the mediaeval anatomist Mundinus (1270?–1326) so that in a day when the use of preservatives was unknown, the most corruptible portions could be dissected first. Thus the "order" comprised the opening of the abdomen followed by the thorax and head and neck, and finally the dissection of the extremities if time would allow or the noisome odour permit. As Larkey has emphasized, the combination was admirably suited for its purpose and as such was the first English manual of practical anatomy. Although Montaña was familiar with the *Anatomy* of Mundinus and the "order" would have been standard practice in any such dissections he had witnessed, we find no rearrangement of this type. Furthermore, his employment of the Vesalian illustrations is not on the same large scale, perhaps due to the absence of adequate printing facilities in Spain, which may also explain why Valverde found it necessary to publish at Rome.

As the author of the first printed anatomy in the Spanish language and as the first to employ the Vesalian illustrations in that country, Bernardino Montaña of Monserrate should be accorded greater recognition than he has received. His work is comparable to that of Vicary in England and to some extent to the English versions of the *Compendiosa* of Geminus. We may dismiss any pretensions to his having any knowledge of either the lesser or general circulation, as claimed by a host of Spanish authors. His selection of a mediaeval text to render into the vernacular may be looked upon as regressive although no more so than the efforts of the vast majority of his contemporaries. Nonetheless he was the first in Spain to recognise, even as an afterthought, the superiority of the Vesalian illustrations. His text, with that of Valverde, shows the same important stirrings which were to bring forth much fruit in all Europe but which was to be choked in the bud in the case of his native Spain. If we are to judge by its rarity, his small volume must have proved highly popular, and we are reminded that the first edition of his English counterpart, Vicary, was apparently thumbed out of existence. The persistence of the de Mondeville tradition is not strange for the new anatomy had scarcely taken root and this mediaeval text, primitive though it may be, did great service in improving standards among the generality of journeyman surgeons since it was commensurate with the technical attainments of the age. It was not until the end of the century that the first surgical text based on Ambroise Paré became available in the tongue of Cervantes.

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Dr. Benjamin Harrison, Temporary Texan*

PAT IRELAND NIXON

An elusive halo, compounded of adventure and doubt, hovers about the head of Dr. Benjamin Harrison. The factor of doubt as to his identity, when all the facts are in, must persist; the factor of adventure in his career is ever present. His is a story of a clever, irresponsible, drunken son of the hero of Tippecanoe — so he claimed — appearing unexpectedly in Texas, captured by Mexican General Urrea, talking his way into the good graces of that worthy, procuring the issuance of soothing proclamations to the Texas colonists, riding away to liberty on General Urrea's best horse, only to return to his home in Ohio on a prosaic river steamer immediately his big moment had passed.

Mission La Bohía del Espíritu Santo was founded on the San Antonio River in 1749. It was one of a chain of missions established by the Franciscans, stretching from Querétaro in Mexico to the Texas-Louisiana boundary. In and around the walls of this mission many hardships have been endured and much tragedy has been enacted. The year 1836 found Texas in revolt against Mexico. The Alamo had fallen on March 6. Colonel J. W. Fannin was concentrating a force near Copano and he was desirous of capturing Matamoros. This hope was abandoned when he learned that General José Urrea had left Matamoros with a large army and was headed northward. Very quickly Urrea destroyed the forward outposts set up by the Texans. This made it necessary for Fannin to transfer his forces to Mission La Bahía at Goliad. On March 11, 1836, General Sam Houston instructed Fannin to fall back to Victoria. Fannin was delayed in leaving Goliad until March 19 and this delay proved fatal. At Coleta the following day Fannin's army was overwhelmed by a much superior force. More than 400 Texans were taken prisoners and on Palm Sunday, March 27, they were cruelly massacred by the Mexican soldiers. Doctor Harrison found himself enmeshed in the fighting around Mission La Bahía.

His story begins in 1806 when his father, General William Henry Harrison, was governor of the newly created Indiana Territory. He was only five years old when his father won a victory over Chief Tecumseh

* From *The Medical Story of Early Texas, 1528–1853*, soon to be published.

and his Indians at the famous battle of Tippecanoe, a victory that was to help make him president of the United States in 1840.

As is usually the case with the offspring of a celebrity, very little is known about the life of Doctor Harrison. He was the sixth of ten children. Where he studied medicine and where he practiced are unknown. It is known that he was married twice; first to Louisa Bonner by whom he had one son, John Cleves Short Harrison, and then to Mary Raney who bore him two sons, Benjamin and William Henry. Both the latter died unmarried.[1]

There is reason to believe that family infelicity colored the career of Doctor Harrison. And alcohol played its part. President Harrison was a strict and consistent teetotaler, but his sons apparently did not follow his teachings. William Henry Harrison, Jr., was forced to abandon his law practice because of drunkenness.[2] Recently Clarence Wharton has acquired some letters written in 1833 by General Harrison. One of these refers to "my son Benjamin who is on a trapping expedition on the Big Horn River;" and in another, written in May 1834, General Harrison states: "To my astonishment and regret my son Benjamin returned from the Rocky Mountains. . . . In his trip he squandered a thousand dollars in a way wholly unaccountable."[3] Some light on the disposition of this money might have been obtained from the diary of Charles Larpenteur, a French furrier, who made an expedition to the upper Missouri River in 1833. Larpenteur records that one of his companions was "Old General Harrison's son with a view to break him from drinking whisky."[4]

Wharton's data establish the fact that Benjamin Harrison was possessed of a restless spirit. He returned from the west in 1833 or 1834, not long before echoes of excitement in Texas were doubtless reaching Ohio. It is not difficult to believe that such a situation might appeal to such a man and that some slow Mississippi river-boat of this period had as one of its passengers Dr. Benjamin Harrison, son of General Harrison. Credence is lent to the belief that Doctor Harrison actually came to Texas by this statement from ex-President Benjamin Harrison in 1897: "I had an uncle Dr. Benjamin Harrison who died when I was a lad. I have only a faint recollection of him. He was of a wild and adventurous disposition, par-

[1] Charles P. Kieth, *The Ancestry of Benjamin Harrison, President of the United States of America, 1889–1893* (Philadelphia, 1893), p. 96.

[2] Simeon Johnson, *Some Forgotten Facts in the Life of William Henry Harrison* (Cincinnati, 1933), p. 1.

[3] Clarence R. Wharton, *The Phantom Dr. Harrison. A Story of the Goliad Campaign* (Houston, n. d.), p. 11.

[4] Elliott Coues, ed. *Forty Years a Fur Trader on the Upper Missouri. The Personal Narrative of Charles Larpenteur, 1833–1872* (New York, 1898, 2 Vols.), Vol. I, p. 16.

ticipated, I think, in the Texas war of independence, and in a good many other frontier scrapes."[5]

More definite proof of his presence in Texas is found in the recently discovered *Ann Raney Reminiscences*. According to this source, he married Mary Raney, probably in 1834, and practiced medicine near Brazoria until 1836. Doctor Harrison was 33 years old, his bride 17. The courtship, the marriage, and some facts about Doctor Harrison are set forth in this quotation:

One evening in November I was taken sick and a physician was sent for, Mr. B. H. I found it to be the son of General Harrison of Ohio. He had just come into the country to practice medicine. On meeting my sister and conversing with her, he seemed pleased in her society, so he often gave us a call, and became a confirmed lover of my sister, Mary. Reports flew around during this time injurious to himself, which I told my sister to acquaint him with. One was that he drank too much liquor, and the other that he was an imposter, that he was no more General H's son than she was the Queen of England. After my sister told him the reports in circulation, he told her that for the satisfaction of her sister, he would write his father and let me know all about him. In a short time afterwards, I received a letter from General H., himself, stating that he had been requested by his son to address a few lines to me for my satisfaction. His son, B., he said, he had sent to Texas, throwing him on his own resources for support. He said he had been in the habit of drinking, and during those times had run him into debt, telling me all his imperfections, and everything relating to him; winding up by saying, "If your sister sees proper to marry my son after my stating the truth, the latch of my door shall never be shut against them, and my house shall be their house; but I never will give my son a fortune as he has spent one already for me, but at my death, I will provide for his wife and children," concluding by saying, "If you and your husband ever come to Ohio," he would be glad to see us. As soon as I received the letter, I begged my sister not to think of marrying Mr. B. H. She had already seen trouble on account of an intemperate husband, to reflect seriously on the subject, and wait until he reformed, specifying a time of six months for this purpose. Mr. H. agreed to our proposition. I had never seen him under the influence of liquor, although many of his friends had; nevertheless, he was quite sober when he came to see Mary. In about two weeks after our contract, one morning as I came out of my room, I was surprised to find my sister's room door open, it being earlier than she was in the habit of rising. I went in and found her trunk of clothes gone. I suspected all was not right. On asking the servant if she had seen my sister, she said she had not. After breakfast one of our neighbors, Mr. C., called at our house, and said there had been a wedding that morning, and asked me if I could guess who it was. I said, "Is it not my sister?" He replied that it was. I was not much surprised. Mr. B. H. was a fine looking man, fair hair and eyes, stood six foot high, fine form, very intelligent, and a perfect gentleman in manners

[5] *Ibid.*, footnote, p. 17.

and address. I know my sister loved him, and I am sure he did her. They did not return to our house, as they knew I would be very far from approving of such a course as they had pursued. Major H. had not been dead but three months. Propriety itself would have called for them to have waited longer. They went to housekeeping, and shortly after their marriage received supplies of provisions from Mr. H's father. They lived but three miles from me. My sister wrote to me to come and see her, but I did not get a chance to go. Mr. B. H. came several times with a message from my sister, but I treated him a little cool, as I did not think he had treated me right in running off with my sister and having a clandestine marriage.[6]

Little or nothing is known about Doctor Harrison during the next year or so. He sent his wife back to Ohio soon after their marriage and she did not return until after his death in 1840. He was captured by General José Urrea in late March or early April 1836. He remained with General Urrea only a few days but that was long enough to find favor in the general's eyes. On April 9, 1836, this entry was made in Urrea's diary published in 1838: "On the same day I sent young Doctor Harrison, my prisoner (the son of a general of the United States) to the colonies with the special mission of speaking to the colonists who had not taken up arms, offering them guarantees and the protection of the army. It will later be seen that this measure was not fruitless.[7]

On April 22, he records:

I marched to Brazoria which I occupied at ten in the morning of the same day. Many English, American and German colonists awaited me at this place with their families as a result of the commission I had given to Doctor Harrison on the Colorado to allay their fears. They expressed satisfaction with the treatment accorded them. . . . They offered, among other things, to turn over to me Galveston Island. . . . It is a homage due to justice to confess that Doctor Harrison had contributed very decisively to the good disposition that was noticeable among the colonists. He thought, on his part, that he owed me his life, and he omitted no means to express his gratitude, even going to the extent of risking it a second time because he thought he owed it to me.[8]

On April 15, according to Gray, Doctor Harrison arrived at Lynch's Ferry. He stated that he had been captured near Goliad but was released a short time later by General Urrea. He explained his release by relating how he was the son of General William H. Harrison, who became presi-

[6] *Ann Raney's Reminiscences.* Manuscript, Duke University Library. Book 3, pp. 13 and 14.

[7] José Urrea, *Diario de las operaciones Militares de la division que al Mando del General José Urrea hizo la campaña de Tejas* (Victoria de Durango, 1838). Translated by Carlos Castañeda in *The Mexican Side of the Texan Revolution* (Dallas, 1928), p. 239.

[8] *Ibid.*, p. 241.

dent of the United States five years later; how it so happened that while his father was minister from the United States to Colombia, General Urrea was minister to the same country from Mexico; and how General Urrea, out of respect and regard for the father, had befriended and released the son. "He was entertained in the General's tent," according to information given to Gray, "and was permitted to return to the United States on his parole. The General, on his departure, gave him a fine riding horse, $100, a cloak, and also permission to bring off an American prisoner as a servant."[9] He also received a sword from Colonel Garay.

Doctor Harrison seems to have been anxious to fulfill the conditions of his parole by getting back to the United States as soon as possible. He sold his gift-horse to "Colonel Houston" for $50, presented his sword to President David Burnet, and caught the first boat out of Lynch's Ferry.

The next definite record of the mysterious Doctor Harrison appears in the *Louisville Courier* of June 21, 1836: "Young Zavala & Dr. Harrison (son of General Harrison) came as passengers on the Good Hope."

Four years later this man of adventure went the way of all flesh. In the family burial ground at North Bend, Ohio, may be seen a marble slab on which appears this inscription:

ERECTED IN MEMORY OF
DR. BENJAMIN HARRISON, SON OF
WILLIAM HENRY AND ANN HARRISON
BORN SEPTEMBER 8, 1806
DIED JUNE 17, 1840
AT NORTH BEND[10]

To this disjunctive story of Doctor Harrison, there are a few interesting sidelights. In a letter written on April 6, 1836, by James W. Robinson to President David Burnet, Harrison's career was mercilessly ended in this fashion: "Gen. Wm. H. Harrison had a son (Dr. Harrison) recently inhumanly butchered at Victoria, who was not in arms, or in any hostile attitude whatever. It would be well to inform his Father of his melancholy fate, & ask his interference in our behalf, 'he was literally cut into pieces on a log like a mess of pork.' So says my informant just arrived from the scene of slaughter."[11] This report was patently nothing more than a camp rumor, as Robinson was not in a position to write with accuracy.

There is no doubt of the reality of Dr. Benjamin Harrison, son of General William Henry Harrison. The factor of doubt is injected when

[9] Col. Wm. F. Gray, *From Virginia to Texas, 1835* (Houston, 1909), p. 162.

[10] Wharton, *op. cit.*, p. 13.

[11] *The Papers of Mirabeau Bonaparte Lamar* (Austin, 1920, 7 Vols.), Vol. I, p. 350.

one attempts to establish the fact of his presence in Texas. Prior to the work of Wharton and the discovery of the *Ann Raney Reminiscences*, he had been dismissed as a clever impostor. This dismissal was based particularly on the testimony of Herman Ehrenberg, one of the survivors of the Goliad Massacre. It seems established that a man who represented himself as "Dr. Harrison" did figure in the story of Goliad; but there was some justifiable doubt as to whether he was the son of General Harrison. Ehrenberg makes this rather derisive comment:

> This hero was found by the Mexican cavalry in the valley of the Guadalupe river and was at first cuffed about after regular Mexican fashion, but after a little while, he succeeded in winning the favor of Urrea. He was in fact a very peculiar individual, and up to the present time (1842) his appearance in the prairies has been a riddle. That he was not the son of the old General Harrison has long been proven. But why he wandered around alone in the wild west and who he was is yet to be solved. That he it was who persuaded Urrea to issue a proclamation to the citizens of Texas in which a general amnesty was promised, we know. That Urrea expected attractive results, in spite of Santa Anna's proclamation to the same effect that had been contemptuously rejected by the colonies, is also known to us; and it was later reported to us that the Yankee doctor was finally sent with a large bundle of Mexican magnanimity and love to the rebels in which he really presented the many offers, calling their (the Texan's) attention to the large, confidence-inspiring zeal of Urrea.[12]

After Doctor Harrison had won the favor of General Urrea, according to Ehrenberg, he waxed boastful: "Doctor Harrison, in whose narrow shouldered figure and Lord's prayer face the gigantic and ever active spirit of the Yankee Nation lived, asserted a truer Buckeye never traveled through the States than the Doctor Harrison standing before us. He said that his father, the old general Harrison soon expected to become president of the Union; that his party aimed to take the field with the catchy slogan of Log Cabin and Hard Cider against the metallic silver system of Jackson, Van Buren and Company."[13]

Ehrenberg fails to agree with Urrea about the success of Doctor Harrison's mission to the Texas colonists. He states that they received him with contempt and threats of tar and feathers. It seems that the doctor was not noted for his horsemanship, and when an eighteen-foot fence rail was exhibited, he chose to cease his argument that the colonists accept Urrea's proposals. Ehrenberg dismisses this doubtful but interesting char-

[12] Hermann Ehrenberg, *Fahrten und Schicksale eines Deutschen im Texas* (Leipzig, 1845). Translated by E. W. Bartholomae, 1925. Manuscript in the Library of the University of Texas, p. 290 c.

[13] *Ibid.*, p. 290 b.

acter with this paragraph: "Through one of his tricks he got out of Urrea's imprisonment and by another one he evaded the unpleasantness of a lynch operation, by playing the bold and unaffrighted role when his pleadings would not help. He knew how to take the backwoodsmen on their weak side by his boldness. The Doctor X, as we may call him, disappeared and no one ever heard who he was, what he was, where he went to, or from whence he came."[14]

Wharton concludes his interesting and well told story by saying "that General Harrison had a doctor son; that he was a wanderer and somewhat prodigal; that he was in all probability in Texas in 1836; and that he sleeps in the family burial ground at North Bend."[15]

However confused and inconclusive the details of Doctor Harrison's life may be, the fact remains that he was one to stir the interest of the historian and the fancy of the novelist. If his life was compounded of adventure and doubt, one would like to emphasize the adventure and dissipate the doubt.

[14] *Ibid.*, p. 290 g.

[15] Wharton, *op. cit.*, p. 13.

Medical Education in 17th Century England

PHYLLIS ALLEN*

I cannot but wonder that some Physicians, who are eminent for learning, should be so absurd, as not to be ashamed even now openly to profess, that all things which may make for the perfection of Physick, were known to any one or more of the Antients, although they are discovered to be false by every days experience. — SYLVIUS

IN seventeenth century England medical education[1] was carried on primarily in the universities of Oxford and Cambridge. Though it was still possible for a man to secure a degree through royal or church patronage, physicians of any standing were regular university graduates. A few studied with practicing physicians, but usually these men had no intention of becoming doctors themselves and they hardly ever tried to practice without first securing a university degree. Modern scientific method rose to major prominence in the seventeenth century, and the effects of this "new philosophy" were felt in medicine. As everyday medical practice became more scientific and therefore more exacting, the possibilities of entering the profession without sufficient background became more remote. The impact of increased demands on the part of the medical profession was felt in the universities. It was during the seventeenth century that the classical curriculum in medicine began to show signs of giving way to a more modern and scientific program.

I

During the early days of Oxford and Cambridge, medicine (physic) was studied in the medieval fashion then used at the continental universities. In the fourteenth and fifteenth centuries medical instruction was largely theoretical, and logical method was considered superior to practical ex-

* Rochester Museum of Arts and Sciences, Rochester, New York.

[1] The author is greatly indebted to Dr. Max H. Fisch of the Army Medical Library, Cleveland Branch, for encouraging this study and placing materials for it at her disposal. Dr. Kenneth Franklin has kindly called her attention to an earlier study, A. Chaplin, "A History of Medical Education in the Universities of Oxford and Cambridge, 1500–1850," *Proceedings of the Royal Society of Medicine*, 13, Sec. Hist. Med., 83–107, 1920.

perience. An academic, verbatim knowledge of the writings of the ancients, usually as found in the commentaries of medieval writers rather than in the original, served the physician adequately in that non-scientific age. The ability "to *reason* upon Diseases and their Cures [was thought] a necessary qualification for a Physician."[2] Surgery and the preparation of medicines were considered manual labor, beneath his dignity. Practical exercise in the art of healing, as well as the actual observation of disease, had no place in the curriculum.

It is not surprising, then, to find that lectures were given according to scholastic methods. The student's attendance was required "at least once" at the more important ones. Galen was the most popular author for centuries, and Hippocrates was more frequently studied from Galen's commentaries than from the original. Other authors lectured upon were: Johannitius, *Isagoge* (ninth century); Theophilus Protospatharius, *De Urinis* and *De Pulsibus* (seventh century); Isaac Judaeus, *De Urinis*, *De Diaetis Particularibus*, *De Febribus* (tenth century); and Nicolaus Salernitanus, *De Viatico*, *Antidotarium* (twelfth century).[3] All these authors disappeared from the curriculum during the sixteenth century.

Many practicing physicians in the fourteenth and fifteenth centuries had never seen the inside of an English university. Few degrees were given at either Oxford or Cambridge before the seventeenth century. Most medical students of the day went abroad to study at the good continental universities. The greatest number went to Padua until the religious difficulties of the late sixteenth and early seventeenth centuries made it advisable for them to go to the Protestant Dutch schools. The English universities became alarmed at the number of men studying medicine overseas. In 1421, they sent a petition to Parliament asking that a law be made to the effect that only graduates of Oxford and Cambridge could practice in England. Parliament granted the petition and from that time forth it was necessary for graduates of foreign universities to become "incorporated" with an M.D. at either Oxford or Cambridge before they could follow their profession. By the seventeenth century incorporation appears to have become largely a routine procedure.

During the early sixteenth century the Renaissance touched English medical studies. The Royal College of Physicians was founded in London,

[2] [J. Moyle] *The Present Ill-State of the Practice of Physick in this Nation Truly Represented: and Some Remedies Thereof Humbly Proposed to the two Houses of Parliament.* By a Member of the College of Physicians (London 1702), 2.

[3] H. Küry and H. Haig. "The Beginning of Medical Education at Oxford and Cambridge," *Ciba Symposia*, June 1941, III, No. 3, 873.

with the avowed purpose of ridding England of quacks and raising the standards of practicing physicians; lectureships and professorships were founded in both universities; scholarships were added for medical students, and attempt was made to raise the standards so that students would be tempted to stay at home.

The first innovator was Thomas Linacre (1460–1524), who founded the Royal College of Physicians in 1518 with the blessing of Henry VIII. In 1524, Linacre established three medical lectureships in the universities, two at Oxford and one at Cambridge. Under Edward VI the Oxford lectureships were given to Merton College and the Cambridge one to St. John's College. The endowment funds for these lectureships, £30 per annum, from Linacre's estate, were invested in the Mercers Company of London.[4] The Linacre Lectures were to be given in the "art of medicine." In Cambridge the lectureship was usually held by the Regius Professor, while at Oxford two additional doctors were added to the faculty.

The second innovator was Henry VIII himself, who founded the Regius Professorships of Physic at both Oxford and Cambridge in 1540. These were the first endowed professorships in medicine in either university. The informal tuition of the past was now replaced by a more academic arrangement.

The third and most important innovator of the sixteenth century was John Caius, Master of Gonville College, Cambridge, who imported the new study of anatomy into Cambridge from Padua, where he had studied under the great Vesalius. He obtained a grant from the crown for the dissection of one subject annually at Gonville College. In 1557, he endowed three fellowships in his college, two of which were restricted to students of medicine, and twenty scholarships.[5] With the possible exception of two fellowships in Trinity College, Caius' endowment was the first left directly for such a purpose. John Caius' great work in modernizing and improving the curriculum was not appreciated in his time and he was ousted from his position by his more conservative colleagues. Later, in tribute to his work, his name was added to that of the college. The medical reputation of Gonville and Caius College attracted numbers of young men during the seventeenth century.

In spite of Caius' improvements many students still found it to their

[4] Rymer's *Foedera*, XIV, 25. An excellent study of Linacre's work is to be found in A. P. Cawadias, "Thomas Linacre and the First Scholar-Physicians of Oxford," *British Medical Journal*, 1936, II, 550–52.

[5] Charles Goodall, *An Historical Account of the College's Proceedings against Empiricks and Unlicensed Practitioners, etc.* . . . (London 1684), biograpical section.

advantage to go abroad for their education in medicine. Oxford and Cambridge had little to offer in either faculty or curriculum. In the reign of Edward VI, a Royal Commission was sent to Oxford to inquire into and revise the educational system then in use there. The commission had the authority to make sweeping changes and even to establish a separate medical college.[6] It contented itself, however, with modifying existing institutions. The commission did revise some regulations governing medical studies. It now became necessary for a student to study six years, attend two dissections, participate in two disputations, and pass an examination before he was given the bachelor's degree in medicine. The doctor's degree was given after he had completed two further disputations, two more examinations, and had attended two more dissections. He was required to perform at least three cures before he could get a license to practice. Though the old scholastic form of the disputation was preserved intact, the addition of some practical studies foreshadowed the reforms of the seventeenth century.[7]

II

At the opening of the seventeenth century the state of medical studies in the universities was such that further reforms were urgently needed. Though facilities for the study of medicine and surgery at Oxford and Cambridge had been increased during the previous century, they were still inadequate. Each university had gained a Regius Professor of Medicine and one or two Linacre Lecturers, and furthermore in several colleges of both universities a few fellowships had been allocated to students in medicine. Aside from these permanent foundations, the reforms of the sixteenth century had shown a marked tendency to vanish after a few years. In 1623, Richard Tomlins was able to state, in connection with the foundation of his lectureship in anatomy, "Down to the present day, in neither of the Universities of this kingdom . . . hath there been any anatomical lecture founded or instituted."[8] Provision had been made for dissections in Queen Elizabeth's day, if not earlier, but evidently no dissections were held by Tomlins' time.

Official cognizance was taken of the situation during the reign of

[6] *Oxford University Statutes*, trans. G. R. M. Ward (London 1845), II, xiii, lxxvi.

[7] Küry and Haig, *op. cit.*, 878. Biographies of Cambridge medical men and a brief sketch of that university's medical school in the seventeenth century may be found in H. D. Rolleston, *The Cambridge Medical School. A Biographical History* (Cambridge 1932).

[8] *Oxford University Statutes*, I, "The Caroline Code or Laudian Statutes," 288.

Charles I. William Laud, Archibishop of Canterbury, was appointed by the king to look into the matter of university education, particularly at Oxford. The findings of Laud's commission were embodied in a new set of statutes, usually called the Caroline Code, instituted at Oxford in 1636. This Code was largely a revised collection of existing statutes rather than anything new. Laud's purpose was to make university education more efficient (according to High Church precepts) by regulating the life of the students and the duties of the professors so that the maximum scholastic benefit would result. Though the Caroline Code may have improved the Oxford University program for a few years, by the end of the century it was so out-of-date that change was badly needed. The prolonged use of the statutes (until the nineteenth century) hindered the establishment of scientific studies in the curriculum.

Medical studies were strictly regulated by the Caroline Code. The Regius Professor of Medicine was directed to lecture "in Hippocrates or Galen," and his hearers were to be "all the students in medicine and bachelors [of medicine] until they [were] promoted to the doctor's degree in that faculty, or [had] completed in the University the time which qualifie[d] for promotion to the doctor's degree."[9] The lecturer or professor had to lecture for a "full three-quarters of an hour, in his own person."[10] Fines were imposed for not lecturing. Moreover, the professor was not permitted to deliver his lecture hurriedly and he had to remain behind at the end of it and answer "with kindness" any arguments, questions, or doubts raised by the hearers.[11] The students were supposed to take down the lectures in writing. They were fined for absence or disorderly conduct. The student who overlooked a lecture of the Regius Professor paid the stiff fine of sixpence. The lecturer in Anatomy (presumably this means the Tomlins Lecturer) was to lecture "in a manner and form agreeable to the ordinances" governing that lectureship.[12]

The ordinances of the Tomlins Lectureship in Anatomy were outlined when the lectureship was founded by Richard Tomlins of the City of Westminster (January 15, 1623). The holder of the lectureship was to be, by decree of the donor, the Regius Professor of Medicine. Every spring, after the Lenten Assizes at Oxford, the anatomy reader was to deliver four lectures on the dissected body of an executed criminal, according to the following directions:

[9] *Ibid.*, Title IV, Sect. I, Chap. 16.
[10] Title IV, Sect. 2, Chap. 1.
[11] Title IV, Sect. 2, Chap. 4.
[12] Title IV, Sect. 1, Chap. 15. The sixpence then had approximately one quarter of its present value.

On the second morning after the death of the man who is to be dissected, the body shall be got ready . . . between the hours of eight and nine in the forenoon, and the anatomy reader (with the help of a surgeon to separate, lift, or raise, and point out the parts) shall demonstrate for the space of two hours the situation, nature, and office of the parts which are commonly called natural; for instance, the liver, spleen, belly and intestines.

On the same day, at two o'clock in the afternoon, the anatomy reader shall, for the space of two hours, give further instructions in and teach the situation, nature, and use of the same natural parts.

The very next morning, the anatomy reader shall give public instruction for two hours' space (as above) in the situation and nature of parts which are commonly called vital: that is, the heart, lungs, etc.

The same day, at two o'clock in the afternoon, the anatomy reader shall for two hours demonstrate and teach the situation, nature and office of the animal parts and faculties: that is to say, of the brains, etc.[13]

All the students in medicine and surgery were to attend these lectures, with absence punishable by heavy fines. Before he could obtain his University license to practice medicine or surgery the student had to swear that he had attended the four lectures comprising one complete dissection, and had heard one entire lecture on the skeleton.

Three lectures on the skeleton were given during the Michaelmas term in place of the regular medical lecture. At this course the professor was required to "tell the history of the bones and their situation, nature, and office." At other times during the year he was permitted to give fuller explanations of any part of anatomy he wished, including the skeleton. The endowment of the Tomlins Lectureship provided £3 with which to hire a surgeon to dissect the body and forty shillings to pay for its proper burial.[14]

It is notable that medical students did not have to perform any dissections themselves. Many of the professors had never dissected a human body. Incision was left to the surgeons.

The Caroline Code permitted the University to grant surgeons the right to practice throughout England. The conditions prerequisite to receiving this license were not drastic: the student had first to practice for seven years "with skill, honesty, and repute in that art." He must have performed two anatomies, made at least three cures and been approved by three doctors of the university or by the Regius Professor and one other doctor.[15] Upon graduation he promised to cure four paupers gratuitously and not to overstep the bounds of his own art by attempting to

[13] *Oxf. Univ. Statutes*, I, 289–90. [14] *Ibid.*, 290. [15] Title IX, Section 9, Chap. 7.

practice medicine. Furthermore, he gave his word that he would "not ask too much salary, or delay any cure with the view of greater gain."[16] The last promise is an interesting example of seventeenth century surgical ethics.

The statutes were much more exacting for students of medicine. After taking the degree of Master of Arts, the student had to attend the lectures of the Regius Professor for three full years, and take part in two public disputations.[17] The doctorate in medicine was granted after four more years of attendance at the lectures of the Regius Professor. Moreover, before any Bachelor of Medicine could graduate as Doctor he was required to "publicly read either six solemn lectures, on as many days, from one in the afternoon till two (in which he [might] explain any portion of Galen), or he [could] cursorily explain, in three lectures at fewest, any one of the following books of Galen, that is one book on the Temperaments, on the Differences of Fevers, on the Uses of the Parts, or on Local Affections."[18] Thus, come what may, the University was assured that none should graduate without a good knowledge of the writings of Galen.

In order to become a physician, then, the student had to spend four years becoming a Bachelor of Arts, three more years becoming a Master of Arts, three further years for the Bachelor of Medicine degree, and finally four years for the Doctorate in Medicine, a total of fourteen years.[19] It is no wonder that few in England proceeded to the Doctor's degree. The long incorporation lists for the seventeenth century show that most Oxford and Cambridge graduates in Arts preferred to take their medical studies abroad, where they could learn more in proportion to the amount of time spent.

During the seventeenth century Cambridge University medical studies were governed by the Elizabethan Statutes of 1570. Even as late as 1710 we find Richard Bentley speaking of "the present statutes of Queen Elizabeth," as did his contemporary, Edmund Miller.[20] Though the Lau-

[16] Title IX, Section 9, Chap. 8.

[17] Title VI, Section 5, Chaps. 1, 2.

[18] Title VI, Sect. 5, Chap. 4. "*Ordinary* Lectures included comments of the Reader, *Cursory* Lectures consisted in simply reading the text of the author with the common glosses." C. Wordsworth, *Social Life at the English Universities in the Eighteenth Century* (Cambridge 1874), 207–8.

[19] Title VI, Sect. 1, Chap. 1; Title VI, Sect. 2, Chap. 1; Title VI, Sect. 5, Chap. 1, 3. There were 4 terms to the academic year.

[20] *The Present State of Trinity College in Cambridg, In a Letter from Dr. Bentley, Master of the said College to the Right Reverend John Lord Bishop of Ely* (London 1710), 34–35; *Some Remarks upon a Letter entituled The Present State of Trinity College in Cambridge; written by Richard Bentley, D.D. now Master of the said College, to the Right Reverend John Lord Bishop of Ely. with some Remarks also upon the Preface pretended to be written and publish'd together with the Letter, by a Gentleman of the Temple* (London 1710), 26.

dian Statutes theoretically applied to Cambridge as well as Oxford, actually they do not appear to have been used there.

The Statutes of 1570 had been imposed on Cambridge by Queen Elizabeth despite the objections of the University. In form they were similar to the Caroline Code. We find, for example, the same inflexible rule: "The lecturer in medicine shall read Hippocrates and Galen." The Regius Professor was ordered to lecture "at least four days a week, viz. Monday, Tuesday, Wednesday and Thursday." Heavy fines were exacted for failing to lecture. The professor could, however, alter the day of the lecture without incurring a fine by giving his hearers due notice.[21] The Regius Professor was never *officially* given a chance to lecture on recent authors, although professors who followed the "new philosophy" of Bacon and Descartes managed to inject some of the findings of modern scientists into their lectures.

The Cambridge regulations for students were similar to those at Oxford: "No scholar, under whatever rank and name be he enrolled . . . shall omit any public lecture of that profession for which he is destined, but rather from beginning to end shall listen to it quietly and attentively, and no excuse shall be accepted from him except that of illness or some other very urgent necessity. . . ."[22] Fines were imposed for absence. To be doubly sure that students appeared at lectures, the principal lecturers of all colleges had to send a list to the proctors containing the names of all the students in their respective colleges and what lectures they were supposed to attend. This listing regulation does not appear to have been observed in the seventeenth century.

The medical student was required to study six years for the Bachelor of Medicine degree, see two anatomies, and respond and oppose in the formal exercises. Before becoming a Doctor he had to study five more years, see three anatomies, and make further disputations. Theoretically, as an Arts degree was not required, no dispensation in time or exercise was permitted in any degree in physic, but most famous Cambridge doctors graduated in Arts before studying medicine. A Decree of the Heads of Colleges in 1684 made it obligatory for candidates for the degree of Bachelor of Medicine to "have made their residence in some college the greater part of nine several Terms at least." A Royal Letter equalized

[21] Statuta Reginae Elizabethae, 1570, cap. III, IV, in George Dyer, *The Privileges of the University of Cambridge* (London 1824), I, 160–2. The Statutes were translated for the author by Dr. Dorothy Schullian of the Army Medical Library, Cleveland Branch.

[22] Cap. V.

the exercises required for the degrees of Bachelor of Law and Bachelor of Medicine, though medical students were still "bound to one opposition as formerly."[23]

The statutes providing for the study of anatomy were neglected at Cambridge. The Senate of the University found it necessary in 1646 to pass a Grace remedying the situation. The wording reveals the state of anatomical studies at that time:

> Care shall be taken in accordance with the statutes that the baccalaureate in medicine see three dissections, the student two; and the royal lecturer in medicine shall perform one each year, providing the hearers pay the expenses; however, for several years now, in order to effect some slight saving, no dissections at all have been made in the faculties of medicine and surgery. This has been greatly to our disadvantage and has led to an injury in statutes and students which is not to be tolerated.[24]

The Grace made provision for at least one annual dissection in the future and the Regius Professor, who also lectured on anatomy, was ordered to hold a dissection for three for four days "at the beginning of the term, after the first of January." Fees were announced for the various types of students. The Professor was to use these fees to pay for instruments and services needed in acquiring, dissecting and burying the cadaver. He appears to have been free to deliver the anatomy lectures in any form or order that he wished. Students in surgery had to make two anatomies and perform two cures.

The Elizabethan Statutes and the Caroline Code established the rules governing the study of medicine in Cambridge and Oxford. Such were the ideals under which medical studies were to flourish. Unfortunately those who framed them were unaware of the importance of the intellectual currents of their day.

The greatest single intellectual movement in the seventeenth century was the rise of science. Francis Bacon sounded its keynote in England. With the assistance of Thomas Hobbes he cleared the atmosphere for the acceptance of inductive science by skilfully removing it from the realm of religious discussion (and opposition). The scientific movement gained momentum as the century wore on. The distinguished discoveries of the seventeenth century caused Whitehead to call it "the century of genius."

In the medical sciences it was a golden age of discovery. The greatest

[23] Cap. XV, XVII; Dyer, *Privileges*, I, 339; 373–4, April 1681. There were three terms to a year.

[24] *Ibid.*, 243–4. Decrees of the Senate or Graces. Nov. 28, 1646, De impensis pro Anatomia suppeditandis.

English physiologist was William Harvey, a Cambridge graduate, who studied medicine at Padua. Harvey returned from Padua in 1602, and became incorporated at Cambridge. He established a practice and quietly continued his researches. In 1616, as Lumleian Lecturer at the College of Physicians, he announced his observations concerning the circulation of the blood. These lectures were not published until 1628, and little attention was drawn to his new theory during the period after its announcement but prior to its publication. Within nine years of publication his doctrines had penetrated the universities, a case of remarkable speed in the acceptance of a new idea.

Francis Glisson, the Regius Professor of Medicine at Cambridge, persuaded one of his students, John Wallis, to maintain the doctrine of the circulation of the blood in his disputations for his Bachelor of Arts degree in 1637. Undoubtedly the older and more conservative Galenists on the faculty were shocked, though there is no record of a protest against such a procedure at this time. Wallis' introduction of the "new philosophy" into an undergraduate disputation was rather a unique phenomenon for its time. Most undergraduates contented themselves with the usual time-honored questions, such as

> An vita hominis sine respiratione consistere possit? Aff.
> An omnes corporis partes sanguine nutriatur? Neg.
> An liceat morbum morbo curare?
> Incantatio non valet ad curam morbi.
> Medicamenta non sunt cibis conmiscenda.[25]

These problems were not settled by experimentation or by observation, but by discussion. At academic disputations "the same knots were tied and untied; the same clouds were formed and dissipated." (Whewell) Almost all of these barren discourses relied upon the ancients for their form and content. At least the disputation in which Wallis took part must have awakened the hearers, if, indeed, there were any.

Disputations, as well as lectures, were very poorly attended. At the latter, in spite of the fines imposed for non-attendance, the professors sometimes were forced to discontinue their classes for lack of auditors. Since the lectures were apt to be several hundred years behind the times it is not surprising to find that they had little appeal for the student. This was especially true of all the scientific lectures. Students could learn more that was "in touch with life" by studying modern texts independ-

[25] R. W. T. Gunther, *Early Science in Oxford* (Oxford 1937), XI, 164.

ently of the university. Some men, though not necessarily enrolled in the faculty of medicine, were interested in modern scientific medicine. They looked beyond the university walls for up-to-date teaching of a type not obtainable within the university. Sir Kenelm Digby took a correspondence course with "the Rev. Mr. Sandy (Richard Napier) of Great Lindford, who superintended his :dies, which included *Physick* and *Chirurgery*."[26]

At the time of the Commonwealth there was great interest in science at Oxford. Cromwell appointed up-to-date London scientists from Gresham College to the faculty. Some students and members of the faculty held meetings to discuss the latest researches in the "new philosophy." A goodly proportion of the members of this Oxford Philosophical Society were physicians. This group was the direct forerunner of the Royal Society.

Anatomy was a particularly popular study. In 1649 William Petty came to Brasenose College and Aubrey tells us he "cut up doggs and taught anatomy to the scholars. . . . Anatomy was then but little understood by the university. . . . He kept a body . . . a good while to read on, someway preserv'd or pickled. Here he lived and was beloved by all the ingeniose scholars, particularly Ralph Bathurst of Trin. Coll. (then Dr. of Physique); Dr. John Wilkins (Warden of Wadham Coll.); Seth Ward, D.D. Astronom. Professor; Dr. [Robert] Wood; Thomas Willis, M.D., etc. About these times experimental philosophy first budded here and was first cultivated by those vertuosi in that darke time." Petty also taught chemistry to the young scholars, "to his and their great benefit."[27]

The effectiveness of the study of anatomy was greatly improved by this practice of giving lectures to small groups of students. John Wallis relates that "Dr. Musgrave while he was Fellow of New College in Oxford . . . (upon the request of some persons agreeing for that end) did with them go through a course of Anatomy; and the like hath been done (more or less) by Dr. Willis, Dr. [Richard] Lower, Dr. [Edward] Hannes and others for their own satisfaction and for the information of such as . . . desired it."[28] Christopher Wren, while at Oxford, was noted for his knowledge in anatomy, and Dr. Willis valued him so highly that he chose him to make the drawings for his book on the brain (*Cerebri Ana-*

[26] *Ibid.*, I (Oxford 1923), Part I, 38.

[27] John Aubrey, *Brief Lives, chiefly of Contemporaries* . . . ed. Andrew Clark (Oxford 1898), II, 141; Anthony Wood, *Athenae Oxonienses* . . . , 2nd ed. (London 1721), II, 807.

[28] John Wallis, "Letter Against Mr. Maidwell, 1700," *Collectanea First Series* (Oxford 1885), Pt. 6, (ed. T. W. Jackson), 316.

tome, 1664). Wren, one of the early members of the Royal Society, was interested in all the sciences, though he is better known as an architect. Willis, who conducted most of his researches in the field of anatomy, was the Sedleian Professor of Natural Philosophy.

Public and private dissections were commonly performed upon the bodies of condemned criminals. In those days, "as the supply of executed criminals was apt to be precarious, the Professor had to summon his class hastily, when opportunity favored a demonstration. . . . A public dissection by those early anatomists was a rather sporting event for there was always a chance that their subjects might come to life again."[29] Several times the subjects did, constituting a difficult legal problem. When human bodies were not available, animals were used, not as a study in comparative anatomy, but to show the various organs and their positions.

At Worcester Hall, Oxford, courses in anatomy were inaugurated in 1698. These were not very modern, for the anatomist had to comment upon the first verses of the twelfth chapter of Ecclesiastes in his lectures "in order to explain his anatomical teachings." Somewhat earlier, in 1692, an unknown Italian scholar moved to Oxford and took classes of students in anatomy. During the same period, James Keill, the Savilian Professor of Astronomy, "read anatomical lectures at Oxford and also at Cambridge." Scientists were truly versatile in the seventeenth century. So successful were all these small lectures in anatomy that Marchmont Needham of All Souls College complained of the neglect of chemistry for anatomy.[30]

Only exceptional students attended such extra-curricular activities. The average man did not undertake any studies in science unless compelled to do so by the statutes. He enrolled in a college, followed the college and university regulations to the letter and, after a rather dull intellectual life and usually a lively social one, he was graduated in due course. If he sought further degrees he remained a few more years and eventually retired from the university to a comfortable if obscure living in the country. Even most medical graduates did not attempt to practice in London where competition was keen. The usual student did not bother his head with the "new philosophy."

[29] Gunther, *op. cit.*, III (Oxford 1925), 88, 90–91. Anthony Wood mentions two cases where the "corpses" came to life,—*The Life and Times of Anthony à Wood, Written by Himself and published by Mr. Thomas Hearne . . .* (Oxford 1772), 63, 110.

[30] Daniel and Barker, *Oxford University College Histories, Worcester College*, 160; Anthony Wood, *The Life and Times of Anthony Wood . . .* ed. Andrew Clark (Oxford 1892), III, 387; Christopher Wordsworth, *Scholae Academicae* (Cambridge 1877), 184; Gunther, *op. cit.*, XI, 158.

A few men, however, were not at all conventional. One of these was John Radcliffe. His contemporary biographer tells us something of his student days:

> The Business he was intent upon, was no less than the Preservation of Mankind, and this he did not endeavour to make himself Master of, by an useless Application to the Rubbish of Antiquity, in old musty Volumes, that requir'd Ages to be thoroughly perus'd, but by a careful examination of the most valuable Treatises that saw the Light from modern Hands. His Books, while he was a Student in Physick, (for so we must term him, 'till he becomes a Practitioner) were very few indeed, as to make Dr. Bathurst, the Head of Trinity College, (who notwithstanding his Seniority in the University, kept him Company for his Conversation) stand in surprize and ask, *Where was his study?* Upon which, pointing to a few Vials, a Skelleton, and an Herbal, he receiv'd for Answer, Sir, *this is* Radcliffe's *Library*.[31]

In practice Radcliffe followed the example of Willis and that of his contemporary, Thomas Sydenham, the English Hippocrates. His treatment of small pox was a radical departure from the Galenics of his day. In fact, it was his very radicalism in this and other matters that set him apart from and above the average doctor of his period.

John Ward notes in his *Diary* that the English Hippocrates had a very low opinion of medical studies in his day: "Physick, says Sydenham, is not to bee learned by going to universities, but hee is for taking apprentices; and says one had as good send a man to Oxford to learn shoemaking as practicing physick."[32] The general trend in medicine at this time, especially as demonstrated by Sydenham, was to develop a system of careful observation, which resulted in some differentiation and reclassification of diseases. Such a trend, of course, was scarcely noticed at the universities. It now seems almost unbelievable that a medical student should be required to spend from three to seven years studying the authors, Hippocrates and Galen, and that he should be able to fulfill all his required anatomical studies in three days. Worse still, as we have seen, the Cambridge University statute requiring attendance at the dissections had been overlooked by the faculty until 1646, so that many men graduated without even the benefit of those three days!

In the early part of the seventeenth century, English students had few modern books in medicine. Dr. William Harvey suggested to the young John Aubrey that he read "Avicenna, Aristotle, Vesalius, Julius Placentinus: De Oculo et Auditu and De Oculo et Visione, and Fabricius

[31] W. Pittis, *Some Memoirs of the Life of John Radcliffe, M.D.* . . . (London 1715), 5–6.

[32] John Ward, *Diary of the Rev. John Ward* . . . arr. Charles Severn (London 1839), 242.

Aquapendente."[33] In later days a much larger number of popular scientific books in all branches of medicine were available. Among these were the anatomies of the Bartholins, Riolan, and Highmore; the physiology of Descartes, and many specialized books such as Culpeper's herbal, Molines on muscles, Willis on the brain, and Bovey on psychology.[34] Many scientific monographs on specific diseases were also used. Then as now, other books more superstition than science were in vogue.

One of the more interesting duties of a physician in earlier times was the casting of horoscopes. Astrology, therefore, had been an important part of medical practice in the sixteenth century. The physicians had to be able to make astronomical observations for this work and it is not surprising to find that the advances in astronomy interested them. Some doctors even wrote popular books on the subject.[35] Astronomy was one of the subjects included in the course of studies for the Master's degree and most students had completed it before they began to study medicine.

In addition to astrology, the future members of the medical profession were trained in the use of medicinal herbs. For this purpose physic gardens were founded. Magdalen College, Oxford, had one as early as 1621, while the University garden was founded in 1632 by Henry Danvers, Earl of Danby. The Oxford University Physic Garden contained a great variety of strange and rare herbs "for the use of botanists, physicians, and such." The garden grew into a living museum and a trip to it was one of the favorite occupations of visitors to Oxford. Thomas Baskerville describes it as it appeared in the seventeenth century:

Among ye severall famous structures and curiosities wherewith ye flourishing University of Oxford is enriched that of ye Publick Physick Garden deserues not ye last place, being a matter of great use and ornament, prouing serviceable not only to all Physitians, Apothecaryes, and those who are more imediately concerned in the practise of Physick, but to persons of all qualities serving to help

[33] Aubrey, *Brief Lives*, I, 297.

[34] Caspar Bartholin, *Anatomicae Institutiones Corporis Humani* (Oxford 1633); Thomas Bartholin, *Anatomia, ex Caspari Bartholini Parentis Institutionibus, Omniumque Recentiorum & propriis Observationibus. Tertium ad Sanguinis Circulationem Reformata cum Iconibus novis accuratissimis . . . Appendix de Lacteis Thoracicis et Vasis Lymphaticis* (Oxford 1655); Johann Riolan, *Encheiridium Anatomicum et Pathalogicum . . .* (Paris 1649); Nathaniel Highmore, *Corporis Humani Disquistio Anatomica* (Oxford 1651); Réné Descartes, *De Homine* (1662); Nicholas Culpeper, *The English Physitian: or An Astrologo-Physical Discourse on the Vulgar Herbs of this Nation . . .* (1652 and other editions); William Molines, *Myotomia, or the Anatomical Administration of all the Muscles of an Humane Body* (London 1680); Thomas Willis, *Cerebri Anatome* (1664); James Bovey, *Treatises of Active Philosophy* (1677), incl. "The Causes of the Diseases of the Mind," "The Cures of the Mind," and "The Art of Discerning a Man's Selfe."

[35] Francis R. Johnson, *Astronomical Thought in Renaissance England* (Baltimore 1937), 11–12.

ye diseased and for ye delight and pleasure of those in perfect health, containing therein 3000 severall sorts of plants for ye honor of our nation and University and service of ye Comonwealth.[36]

An unsuccessful attempt was made to establish a public physic garden at Cambridge in 1695. It is rather surprising to find that an institution that was such a success in Oxford should be a total failure in Cambridge. Probably this was because the main scientific interests at Cambridge were in physics and mathematics.

One source open to medical students (for reading only) was the college library. At Oxford, the St. John's College medical library dates back to the bequest of Dr. William Paddy in 1555. Other benefactors added to this nucleus so that by the end of the century the college had a very fine collection of books in the medical sciences. The Corpus Christi College library had many medical books as did Magdalen, which received a unique collection of botanical books and manuscripts from John Goodyer.[37] The Bodleian (or University) Library had a small but representative collection in science and medicine.

The college libraries at Cambridge were smaller than those at Oxford. Most colleges had few medical works, and the ones they had were generally classified in their catalogs under the heading "miscellaneous." Gonville and Caius College possessed a concentration of medical books and a few relating to other sciences, but this situation was the exception rather than the rule.

In the seventeenth century, the libraries and lecture halls also served as museums. In spite of agitation for removal to separate establishments, much scientific apparatus was housed there. When John Evelyn visited Oxford in July, 1654, he took his wife to the Physic School where they saw "nothing extraordinary save the skin of a jacall, a rarely colour'd jacatoo or prodigious large parrot, two humming birds not much larger than our humble bee." They then went to St. John's College where they saw "the library and the two skeletons which [were] finely cleansed and put together." On a second visit ten years later Evelyn again went to see "the Rarities in the library . . . [including] a cabinet with some medails and pictures of the muscular parts of a man's body." These pictures were probably the "three large Pictt. of ye Muscles of a Human Body" pre-

[36] John Chamberlayne, *Magnae Britannia Notitia: or the Present State of Great-Britain . . .* (London 1775), Pt. I, Bk. III, 272; "Thomas Baskerville's Account of Oxford, *c.* 1670–1700," *Collectanea Fourth Series* (Oxford 1905), Pt. 4, (ed. H. Baskerville), 187.

[37] Gunther, *Early Science*, XI, 333 (Appendix A), 168.

sented to the Bodleian Library by Thomas Highlord of the city of London in 1662.[38]

The medical collections grew apace during the Restoration Period. In 1663, Charles Willughby presented a collection of botanical specimens he had made at Padua to the library of Balliol College. This library also received seventy-five volumes of *Medical Tracts* and a set of *Miscellanea Curiosa*. One old Bodleian catalog lists a skeleton given to that library by Sir Robert Viner in 1683/4. Nathaniel Highmore, who died in 1685, left his tables of muscles to the Physic School at Oxford. Thus there must have been two tables of muscles in the Physic School by 1690. John Evelyn's tables of veins and arteries were used there as well. The tables had been purchased in Padua.[39] All these visual aids to learning were very popular among students in the continental universities. English students could and should have made use of them, though it is doubtful whether they actually did so.

Medical instruction at Oxford and Cambridge was so far behind that in the continental universities that a large percentage of Englishmen who wished to become doctors went abroad for their education. The most common method was to travel around from one great university to the next, learning from the best masters in each place. Leyden, Padua, Paris, Montpellier, Heidelberg and Basel were the most popular. After obtaining his degree abroad, the student returned to England and was incoporated in that degree at either Oxford or Cambridge. Many men took the precaution to become incorporated at both universities so that there could be no question of their competence.

At Oxford, the standards for incorporation were set by the Caroline Code. The candidate had to obtain the "express consent of the Vice-Chancellor, and of the Professor [of Medicine] and of three doctors in the same faculty, and of the proctors, or a majority of the above-mentioned persons," and he had to have completed as much time abroad as was required for the degree by the statutes of Oxford University or Cambridge. Cambridge University passed a Decree of the Senate (Grace) in January, 1624, governing incorporations, which was essentially the same as the rule in Oxford, except that the candidate was required to respond at a

[38] John Evelyn, *Diary*, ed. William Bray (London 1901), 231, 299; Gunther, *Early Science*, I (Appendix B), 382–3. Old Bodleian Catalogue of Cimelia Extracted from the Registrum Benefactorum, Phillipps MS 13841.

[39] Gunther, *Early Science*, III, Pt. I, 95; XI, 327 (Appendix A); Evelyn, *Diary*, I, 214.

disputation in his Faculty.[40] In both universities, incorporation was largely a formality.

The universities were essentially conservative. Men like Willis, Sydenham, and Radcliffe became great doctors not so much with the aid of the formal instruction they received as in spite of it. At the end of a century in which wide gains had been made in the body of medical knowledge, the universities, by antiquated statute, still compelled the professors to teach medicine from "the old heathens," Hippocrates and Galen. Modern scientific studies were only introduced in the form of small, extracurricular classes. England had to wait almost two centuries for reform in the medical curriculum at Oxford and Cambridge.

III

The conservatism of the universities was caused to a large extent by lack of competition from other institutions of a similar nature. The tremendous political power wielded by Oxford and Cambridge in matters of education enabled them to virtually eliminate any potential competitors. Both Cromwell's University at Durham and the Royal Society were prevented from giving degrees by university agitation.[41] Of course, other institutions existed, and, though they did not give degrees, they did give up-to-date instruction in the sciences. Moreover it was possible to secure a degree under certain conditions without setting foot in a university.

Many men who wished to become physicians did not attend any university, either in England or abroad. Instead they received their degrees from the Church of England. In 1531 an act of Parliament had made it possible for the Archbishop of Canterbury to give degrees in medicine "as well as other faculties." It was not unusual for a student to secure his degree before he undertook the study of medicine. In such a case his theological knowledge outweighed his medical studies. John Ward of the *Diary* fame secured his degree in this way. After graduating from the University of Oxford (*c.* 1652) he decided to undertake the study of medicine independently of any college. Instead of attending lectures, "he associated with the resident practitioners and from them obtained much valuable information. . . . He frequently mentions Dr. Willis, Dr. [George] Bate, and 'one Stephen Toone,' from whom he learned the

[40] Title IX, Sect. 8, Chap. 2 *Oxf. Univ. Statues*, I, 125; Dyer, *Privileges*, I, 236–7.

[41] *The Victoria History of the Counties of England: Durham*. ed. William Page (London 1905), 380–81; *Life and Times of Anthony Wood*, I, 354.

various processes to pharmacy; he also alludes to [Jacob] Bobart who then had charge of 'the physic garden' at Oxford, and who gave him some instruction in the plants of the materia medica." Ward took up these medical studies as an auxiliary to the ministry, so that he would practice when he secured a church living, and so supplement his income. John Woodward, Professor of Physic in Gresham College, London, was another holder of a church degree, secured by a patent from Archbishop Tenison in 1695. The following year he took an academic degree at Cambridge.[42] The Lambeth M.D. (named after Lambeth Palace, the residence of the Archbishops of Canterbury) was not abolished until the Medical Act of 1858.

As early as 1511 a law had been passed permitting the Church of England to grant licenses to would-be physicians. "The licentiates were 'first examined, approved, and admitted by the Bishop of London, or the Dean of St. Paul's, calling to him or them four Doctors of Physick and for Surgery other expert persons in that faculty.' These practitioners 'in nomine Domini' were, nevertheless, distrusted." No doubt this was because they were in such an excellent position to bury their mistakes. The licensing power of the Church was later limited by the privileges of the College of Physicians which did not permit the spiritual courts to license without the testimonial of the College.[43]

In addition to the Lambeth M.D.'s, another special type of medical degree was granted as a sign of Royal favor on very special occasions. This might be considered an honorary degree. Robert Brady (B.M., Caius College, Cambridge, 1653) was created Doctor by virtue of the King's Letters in 1660. Peter Turner received a Royal degree in 1636. "Their majesties, king Charles and his queen, with their courts, having been entertained at Oxford by the University, his majesty at their departure on 31 of August, was pleased to signify his pleasure, that there should be some creations in the several faculties; upon which occasion the degree of doctor of physic was confered on Mr. Turner."[44] Such degrees in medicine were relatively rare.

[42] Ward, *Diary*, 8; John Ward, *Lives of the Professors of Gresham College* (London 1740), 285. Many Dissenting clergymen had studied medicine as well as divinity as a precaution in case of ejectment. See Edmund Calamy, *A Continuation of the Account of the Ministers, Lecturers, Masters and Fellows . . . Ejected . . . by or before the Act for Uniformity* (London 1727).

[43] A. H. G. Doran, "Medicine," *Shakespeare's England* (Oxford 1926), I, 414–15; Moyle, *Present Ill-State of the Practice of Physick*, 7.

[44] Anthony Wood, *Fasti Oxonienses*, V, *c.* 270, quoted in Ward, *Lives of the Professors of Gresham College*, 133.

Medical studies were pursued without actual instruction at the famous Inns of Court by interested students. Matthew Hale "was admitted a Student in *Lincoln's Inn*, 8 Nov. 1629. . . . By his acquaintance [with Will. Noy] it was that he pursued other learning than that of his Profession: so that by great industry . . . he became well read in the Civil and Roman Laws, attained to great readiness in Arithmetic, Algebra and other mathematical sciences. He obtained also a great insight in Philosophy, whether Experimental or Theoretical, Physic, Anatomy and Chirurgery."[45] This education must have helped him in medico-legal decisions.

The most modern undergraduate medical education obtainable in England during the later seventeenth century could be found in the Dissenting Academies. These institutions of university standing were founded after the Restoration, when the Clarendon Code forced Nonconformists out of the universities. Within a period of thirty years more than twenty-five academies were founded, many of which survived well into the nineteenth century. The Puritan Dissenters generally favored a *useful* education, as opposed to a purely classical one, and therefore accepted experimental philosophy with some enthusiasm. For the study of medicine, the leading Puritan of the day, John Milton, recommended classical sources, such as "the Historical Physiology of Aristotle and Theophrastus" and Celsus' eight books on medicine. For anatomy students he again recommended Aristotle, and suggested "some not tedious Writer of the Institution of Physic; that they may know the tempers, the humours, the seasons, and how to manage a crudity." Even Milton's ample conception of a liberal education as set forth in his tractate, "Of Education," did not include modern sources in science. All the authors he cited were classical ones: Aristotle, Vitruvius, Seneca, Pliny, Celsus, Lucretius, Pomponius Mela, and Theophrastus. He did, however, suggest that students read modern authors when they had finished the classics. He also told them to "procure, as oft as shal be needful, the helpful experiences of Hunters, Fowlers, Fishermen, Shepherds, Gardeners, Apothecaries; and in other sciences, Architects, Engineers, Mariners, Anatomists."[46]

The founders of the Dissenting Academies put this kind of a program into effect. The academies were furnished with laboratories, gardens and libraries, all well-equipped with good instruments, rare herbs and plants,

[45] Wood, *Ath. Oxon.*, II, 573.

[46] John Milton, "On Education," (London 1644), *The Prose Works of John Milton*, ed. J. A. St. Johns, Vol. III, 462–478. The *Proposition* of the Royalist poet, Abraham Cowley, was scarcely more modern than this.

and modern books. "Practical exercises accompanied the course of lectures and students were employed at times in surveying land, composing almanacs, making sundials of different constructions and dissecting animals." The academicians appear to have made actual dissections as a part of their medical course. In most of the academies, courses were taught by means of private reading followed by recitation rather than by formal lectures. Anatomy was one of the most important scientific subjects.[47] Most of the men who attended the academies became ministers, though a great number studied law and medicine as well. They certainly received an up-to-date education. The only institutions that could rival the Dissenting Academies in this respect were the London colleges.

IV

One of the most important institutions of university standing in seventeenth century England was Gresham College in London. Sir Thomas Gresham, Queen Elizabeth's financial agent, left a large proportion of his estate in trust to the city and the Mercers Company to endow an educational institution for the citizens of London. Gresham College opened in 1597 with seven professors, who were to lecture daily on divinity, astronomy, music, geometry, civil law, medicine, and rhetoric, "which Lectures [were] to be read in Term Time every Day, Sundays only excepted; those before noon in Latin; and those in the afternoon, the same in English." So popular were these lectures that the people of London petitioned to have the Professors read out of term time, but this they firmly refused to do. Gresham College not only attracted the citizens of London, but also renowned scientists from all parts. Foreign scholars could attend the morning lectures because they were given in Latin, though the English pronunciation in the seventeenth century is said to have been so bad as to be virtually unrecognizable. However, the English university men who attended the lectures had no trouble understanding the professors' Latin and they formed a lively and interesting group. Long before the men who were to make up the Royal Society met at Gresham College, "groups of scientists gathered [there] to discuss recent developments; and because the lectures of the college were widely patronized by the skilled artisans, expert mechanics and navigators for whose instruction they had been founded, the Gresham Professors were always in close touch with the practical workers in many fields of applied science. . . . Both learned men and artisans brought books they had written which dealt with the mathe-

[47] Irene Parker, *Dissenting Academies in England* (Cambridge 1914), 71, 75.

matical sciences, and submitted them for examination and criticism to the Gresham Professor and his friends."[48]

In medicine, the statutes of the College permitted the professor to deliver up-to-date and informative lectures:

> The solemn lecture of physick is to be read twice every week in the term upon Mondays, the first between the hours of eight and nine in the forenoon, and the second between the hours of two and three in the afternoon of the same day. And for as much as the greatest part of the auditory is like to be of such citizens and others, as to have small knowledge or none at all in the Latin tongue, and for that every man for his health's sake will desire to have some knowledge in the art of physick; it is thought good that the first lecture be read in the Latin, and the second in the English tongue. Touching the matter of the said solemn lecture, albeit the same is to be referred to the discretion of the reader; yet it is wished, that herein he follow Frenelius his method, by reading first physiologie, then pathologie, and lastly therapeutice; whereby the body of the said art may be better imprinted by good method in the studious auditors, rather than be disjointed and delivered out of order by exposition of some part of Galen or Hippocrates.[49]

The fact that these lectures were not tied down to Hippocrates and Galen made it possible for the professors to introduce the work of their contemporaries, and this was frequently done towards the middle of the century. John Mapletoft, in introducing his lecture series, expresses the spirit of the College:

> I doe intend, God willing, as you shall give me opportunity, to discourse of such new inventions in Anatomy, as I think may be most usefull, and best require your time and patience. . . . I will begin with that usefull and celebrated discovery, which was first made, and published to the learned world, by that ornament of his own age, and of this nation to all ages, the judicious Dr. Harvey, concerning the motion of the heart, and the circulation of the blood.[50]

The Gresham College lecturers gave modern postgraduate courses in medicine. Thomas Winston, the third professor, read some of his lectures on anatomy. In these lectures he acknowledged his debt to his own teachers. "Fabricius ab Aquapendente and Prosper Alpinus at Padua, and Caspar Bauhinus at Basil." After the Restoration the newly-formed Royal Society met at the lectures of the Gresham professors and held dissections at the College for its members. "Dissecting instruments were provided at the expense of the Society, and when it was proposed to dissect a body, the following notice was sent to each Fellow: 'You are

[48] Edward Chamberlayne, *A New Present State of England* (London 1750), I, 359; Charles R. Weld, *A History of the Royal Society* (London 1848), I, 81–2; Johnson, *Astronomical Thought*, 264.

[49] Ward, *Lives of the Professors of Gresham College*, pref. vii–viii. Jan. 16, 1597.

[50] *Ibid.*, 275.

desired to take notice that there will be an anatomical administration at Gresham College to begin at ——— day at ten of the clock precisely.'"[51] A goodly proportion of the Royal Society came from the medical profession. The greatest London institution of postgraduate medical studies was not Gresham College, but the Royal College of Physicians, an organization similar to present day medical societies.

The College of Physicians of London was founded in 1518 by Thomas Linacre, for the purpose of raising the standards of practising physicians and getting rid of quacks. Henry VIII granted the new College three important privileges: physicians were not to be made constables or keep watch and ward in the city of London; the College could appoint four physicians to check up on the apothecaries, and power was granted to the College to prosecute those apothecaries who would not admit them; physicians could practice surgery. Furthermore, as confirmed in the Charter of Charles II, no one, not even graduates of English universities, could practice "in London, Westminster, or seven miles thereabouts" except those licensed by the College. No one (except an Oxford or Cambridge graduate) was permitted to practice medicine in England unless he had a "Testimoniall" from the College. The College examined all candidates before issuing such a permit.[52] For those who were to practice in the country this examination was not severe.

The Statutes of the College of Physicians governing the privilege of practicing in London were very strict. The number of candidates for membership was limited to twelve and not more than thirty Fellows were permitted in the society at any time. On candidates, the regulations state:

> We will that none be admitted to that Order, who is not a Doctor in Physick, and by Nation an Englishman, and hath practised Physick for four years.
>
> But if he has attained the Degree of Doctor in any Foreign University, We will, That before he is admitted to Examination, he bring forth his Diploma or Letters Testimonial true and authentick of that University and shew them to the Colledge; and besides that he must have and bring a Testimonial of his Incorporation from one of our own Universities.
>
> We will moreover and ordain, That each Candidate and Permissive, before they be admitted, visit all the Fellows of the Colledge twice, to ask, leave to wit the first time before the Examination, but the second the course of the Examination being finished.[53]

[51] *Ibid.* 266; Weld, *Hist. of the Royal Society*, I, 123.

[52] Charles Goodall, *The Royal College of Physicians of London* (London 1684), 17–20, (32 Henry VIII c40); 85, 98.

[53] *The Statutes of the Colledge of Physicians* (London 1693), 79. Chap. XI Of the Candidates, 93.

Before admission to the College a doctor had to be a candidate for one year unless he had "publickly read Physick in some University of England, or ha[d] been formerly Doctor of the Chair (as they say) in some University of this Kingdom, or ha[d] been the King's Physician in Ordinary."[53]

In some ways the Statutes of the College were scarcely more modern than those of the universities. For example, Fellows were ordered to "read diligently within a year the five first books of Galen concerning Simple Medicine, and all the Books of the use of the parts." The form of the examination of the candidates was explicitly described by the Statutes:

> First, let them be examined in the Physiologick Part, and the very Rudiments of Medicine, and in this Examination let Questions be propounded out of the Books concerning Elements, Temperaments, the Use of Parts, Anatomy, Natural Powers and Faculties, and other parts of Natural Medicine.
>
> Secondly let him be examined in the Pathologick Part, or concerning the Causes, Differences, Symptoms and Signs of Diseases, which Physicians make use of to know the Essence of Diseases; and in this Examination let Questions be proposed out of Books concerning the Art of Physick, of the Places affected, of the Differences of Diseases and Symptoms, of Feavers, of the Pubes, of the Books of Prognosticks of Hippocrates, &c.
>
> Thirdly let him be examined concerning the Use and Exercise of Medicine, or the Reason of Healing; and let that be done out of the Books concerning Preservation of Health, of the Method of Healing, of the Reason of Diet in Acute Diseases, of Simple Medicines, of Crises, of the Aphorisms of Hyppocrates, and other things of that kind, which relate to the Use of Healing; for Example sake, what Caution to be observed in Purging? in what Persons? with what Medicine? and in what Vein, those things ought to be done? Likewise, what is the Use of Narcoticks and Sleeping Medicines? and what caution is to be observed in them? what is the position and site of the Internal Places? and by what Passages Medicines come to there? what is the Use of Clysters, what kind of Vomits, the danger, kind and measure?[54]

One of the privileges granted the College of Physicians was the right to have

> the dead Bodies of the severall persons of Men or Women condemned adjudged and putt to death for Felony or other offence by due course and order of the Lawes of this our Realme within our said Citty of London or our Countyes of Middlesex and Surrey or either of them for Anatomies . . . and from time to time to make incision of the same dead bodies or otherwise to order the same after

[53] *Ibid.*, 95, 120. Chap. XVI, The Form of the Examinations of the Fellows and Candidates and of their Admission.

their discretions att their liberty and pleasures for their further and better knowledge instruction insight learning and experience in the faculty and science of Physick and Chirurgery.[55]

These anatomy lectures were well-attended because at the time of their admission all Candidates and Fellows had to promise to see all dissections for a period of five years. Each Fellow had to perform one dissection at the request of the President.[55] At one time interest in the anatomies ran so high that John Evelyn's tables of veins and arteries were borrowed from Oxford to illustrate the lectures.

The College of Physicians had two special lectureships for the enlightenment of its members. A surgery lecture was founded in 1582 (24 Eliz.) by Lord John Lumley at the suggestion of Richard Caldwell, President of the College. It was endowed with an income of £40, laid as a rent-charge upon the lands of Lord Lumley.[56] The Lumleian Lecture was to be read "in the Colledge every Wednesday and Friday for ever by a Doctor of Physick and fellow of that Colledge."[57]

A pathology lectureship was founded by Theodore Goulston in 1632.

His affection to the public good and to the advancement of the faculty of Physick was such, that by his last Will and Testament he gave 200£ to purchase a rentage for the maintenance of an annual Lecture within the College of Physicians London. Which said Lecture was to be performed from time to time by one of the four youngest Doctors in Physick of the said College, and to be upon two or three or more Diseases, as the Censors should appoint or direct. And this Pathological Lecture to be read yearly in some most convenient season, betwixt Michaelmas and Easter upon some dead body . . . upon three days together, in the Forenoon and Afternoon of each of the said days.[58]

The College was left to its own devices in securing the cadaver for this lectureship.

We know that both of these lectureships were held by able men during the seventeenth century. William Harvey was the Lumelian Lecturer from 1616 until 1656, the year before his death. Francis Glisson, Sir George Ent and Jonathan Goddard were among the annual Gulstonian Lecturers during the Commonwealth Period. Thomas West, who held that lectureship in 1694 "performed the duties of his office to the honor of the College . . . and to the establishment of his own reputation and the general satisfaction of the learned auditory."[58] Unlike the university lec-

[55] Goodall *Royal College*, 113; *Statutes of Royal Colledge*, 131–32. Chap. XVIII, Of Anatomical Administration and the Chirurgical Lecture.

[56] Goodall, *An Historical Account*, biographical section.

[57] John Stow, *Annales, or A General Chronicle of England* . . . Edmund Howes, ed. (London 1631), Appendix, *Universities*, pt. 3, 1079.

[58] Gunther, *Early Science*, XI, 53.

tureships, those of the College of Physicians were of a very high quality throughout the century. No doubt this excellence reflects the fame of those chosen to lecture. It is a pity that the College did not have more influence upon the curriculum in the universities.

Another great London educational institution, also a learned society and closely allied to the College of Physicians, was the College of Barber-Surgeons. Two companies, the Barbers and the Fellowship of Surgeons, were united by Henry VIII in 1540 and the united company incorporated (32 Hen. VIII c42). Surgeons of the company were given exemption from the duties of bearing arms and standing watch. No barber could use surgery, nor was a surgeon permitted to do any shaving. Thus there was a definite separation of duties between the barbers and surgeons. Socially, the surgeons were superior to the barbers. They were allowed to have a sign at their door like physicians, though they were by no means the equals of the physicians. The surgeons were allowed four corpses annually "for the further and better knowledge, instruction, insight, learning and experience in the said science or faculty of surgery."[59] The anatomy lectures in the Surgeon's Hall were actually delivered by a member of the College of Physicians, and they were similar to the postgraduate courses given at that College. No living subjects appear to have been used to demonstrate surgical techniques, though sometimes by accident a corpse came to life.

The courses in anatomy were spread out over a period of several years. For example, a body would be dissected one year to show the muscles. Another body would be dissected the following year to show the bones, and a third the year after to illustrate the parts within the head, chest and abdomen. Dissections had to be completed in two or three days as the anatomists had no refrigeration facilities. The public dissections usually took place four times a year, corresponding to the assizes, and were well-attended. The reader of the anatomy lecture was assisted by two demonstrators, often themselves skilled anatomists.

Sir Charles Scarborough, who lectured for years at the Surgeon's Hall, was the "first to introduce Geometrical and Mechanical Speculations into Anatomy and applied them as well in all his learned conversation, as more particularly in his famous Lectures upon the Muscles of Humane Bodies for 16 or 17 years together in the publick Theatre at Surgeon's Hall; which were Read by him with infinite applause and admiration of all sorts of learned persons about the Town, who resorted in great numbers to those Readings. His SYLLABUS of the Muscles, is, and ever will be used

[59] Goodall, *Royal College*, 24.

there. . . . " At one time Christopher Wren acted as a demonstrator for Scarborough. By 1661 the number of anatomy dissections at the Surgeon's Hall had decreased to two public ones, though some private ones were held by scientists lucky enough to secure cadavers.[60] The greatest English surgeon of the 17th century was Richard Wiseman, the Sydenham of surgery. He was a clinical observer whose contributions to his field show that he possessed the scientific spirit. Wiseman did much to raise the surgical profession "from its state of subordination to the physicians." (D.N.B.)

V

The scientific spirit did not have much effect upon the masses of the population in the 17th century. During most of this period it was not even dominant among the intellectuals. Many still held out against it at the close of the century. A violent pamphlet war continually raged between those who favored the ancient philosophy and those favoring the modern. Charges and counter-charges were hurled with impunity. Though eventually the followers of Sydenham, Willis and other moderns won out, at the end of the century the Aristotelians and the Galenists still appeared to have full sway. As Marchmont Needham expresses it:

> An Extream Affection to Antiquity [has] kept Physick, till of late years, as well as other Sciences, low, at a stay and very heartless, without any notable Growth or Advancement; . . . When Chymistry first came into play, the Professors and Operators were thought to be Mad-men; but afterwards (when they gained some ground and entertainment in the World) the *Aristotelians* and Galenists, seeing that reproach and contempt would not do the work, began to raise a fierce persecution . . . [calling the Moderns magicians, mountebanks, rogues, cheats] till the excellency of the Art itself, and its grand Achievements, opened the eyes of the Governours, and stopp'd the mouths of the Gainsayers; and even the common people came to see, that it was to the Interest of the Collegiate Corporations of Physicians, who lived in ease and splendour, practising with old Maxims and Medicines, not to permit a new laborous Sect of Philosophers, working Knowledge out of the Fire, by their Industry and Successes, to bring a reproach upon them for their Idleness and superstitious devotion to their old heathenish authors.[61]

Furthermore, he adds:

> It is not a Gown, or Degrees taken in Universities, which constitute the Physician, but a solid Knowledge of Nature, grounded upon sound Reason and mature

[60] Goodall, *An Historical Account*, biographical section. The "geometrical and mechanical speculations" may have been Wren's contribution. See Dorothy Stimson, "Christopher Wren F.R.S.," *The Scientific Monthly*, October 1941, LIII, 365; John Ward, *Diary*, 9. Feb.

[61] Marchmont Needham, *Medela Medicinae, A Plea for the free Profession of the Art of Physick* . . . (London 1665), 7–8, 253, 255.

Judgment, improved by Practise and Experience . . . For here lies the Bane of our Profession, that because a Book-knowledge of *Heppocrates*, *Galen*, and the rest that are counted Classick, is admitted in the Universities as a sufficient Test, to try a man's fitness to become a Doctor of Physick, therefore less ingenious spirits content themselves with that sort of Learning, and seldom seek after the other . . . A Doctor bred up in the Contemplative Philosophy of the Schools, may be a Scholar and a very fine Gentleman; but what is that to the curing of a Disease, or the rousing of a Heart-sick Man from his bed of Languishment? This is to be executed rather from one that is qualified for the work by the acquaintance with Mechanick and *Experimental Philosophy*.[61]

Of course, accusations and exposures such as this were vigorously defended and refuted by the Galenists. They pointed to their own respected traditions and decried the attempt to spoil their fine records. If the acceptance of the scientific point of view could have been forestalled by such a wealth of printed words as the ancients put out, science would have been even slower in coming than it actually was.

The College of Physicians had its own difficulties at the end of the 17th century. Quacks and others lacking the education and the high standards demanded by the College were worming their way into lucrative London practices. One member of the College, probably with official backing, sent a petition to Parliament, entitled "The Present Ill-State of the Practice of Physick in this Nation Truly Represented." In it he describes the qualifications and responsibilities of a physician:

Both the *little* and the *great World* are the Subjects of his Search; and how many Books must he read, how many Bodies must he see dissected, and how many Anatomical Lectures must he be the hearer of, before he can know the Seat, the Composition, the Sympathies, the Actions, and the Uses of the parts of *an humane body!* And when he has learnt their Natural and Healthful State and Oeconomy; he has a new and greater Labour to understand how many ways they become preternaturally affected, and what Irregularities and Corruptions they are subject to, with the next and more remote causes thereof. He must by the Institutions of Physick be taught what are the proper, and pathgnomonick Signs of latent Disease; what the causes of Symptoms, and from whence to take indications for Cure: and must read many Volumes of Observations, besides what he can make himself, before he can with any Nicety pass a Prognostick of the Event. He must be able to instruct his Patients in the right and regular use of all Non-natural things, for the Conservation of present Health: and also (according to Indications) to prescribe Remedies for the recovery of it when lost.

And then as to the matter of Medicines, he has the whole Terrestrial World to run over; he must know the Nature and medicinal Vertue of most Plants and Minerals; and also of many Animals, with their Parts and Contents. And lastly, he must have competent Skill how, and in what Forms, Medicines are to be prepared out of these, to be administered to the sick.

Many Years Study and Pains indeed are requisite to attain to the Knowledge of all these things: But whosoever is ignorant but of one Particular mentioned, I dare affirm, is not to be intrusted with the Care of the Lives and Health of Men.

In what an ill state then must we conclude the Practice of Physick to be at this Day, when some presume to exercise it, that know *not* one; and a great many more *but* one (and that the least) part of it?[62]

The author of the petition proposed remedies for the situation, chiefly ones that would strengthen the position of the College of Physicians. It is interesting to note that the medical profession itself favored reform. This spirit, however, arose from economic causes, mainly the successful competition of non-licensed "doctors." In the ancient-modern controversy, the Royal College of Physicians was generally more conservative, as we have seen from the form of its examinations.

Medical education in seventeenth century England was carried on in the universities at the undergraduate level, and in the London Colleges at the postgraduate level. Though the customary medical course took seven years at Oxford and a comparable length of time at Cambridge, it was hardly modern. The prescriptions of the Caroline Code at Oxford and the Elizabethan Statutes at Cambridge forced the Regius Professors to emphasize Hippocrates and Galen, to the detriment of more modern authors. Fortunately, interested students had ample time to attend extra-curricular courses given in the "new philosophy." From the middle of the century anatomy was a particularly popular study in Oxford and in London. At the small classes given by competent instructors the anatomy student could not only learn much more than at the formal three-day dissections held by the Regius Professor, but he also had a chance to catch some of the enthusiasm and inspiration of a leading researcher in the field.

Some men obtained medical degrees from the Church of England in conjunction with their theological studies, which enabled them to omit the prescribed university courses in medicine. It is possible that such doctors were no worse practitioners than their logic-steeped contemporaries who had graduated in due course. Other students received degrees as a matter of royal favor, though Cambridge University gradually limited this prerogative by declining to exempt the recipients of such degrees from the usual fees, exercises and oaths.[63] The medical education most thorough in the light of professional requirements was to be found at the Dissenting Academies. Here and here alone the student received practical instruction

[62] Moyle, *Present Ill-State of the Practice of Physick*, 3.

[63] Dyer, *Privileges*, I, 361–62. Royal Letters. July 15, 1668.

and laboratory work as a part of his regular course. Some of the best courses in modern medicine were given at Gresham College and the Royal College of Physicians. Five years' attendance at such lectures was probably more profitable to the young physician than all his classical training at the university. The surgeons of the College of Barber-Surgeons were sufficiently far-sighted to begin a scientific foundation for their profession by having modern lectures read in their Hall. It was fortunate for them that the ancient Greeks had disdained the manual art of surgery.

At the close of the seventeenth century the classicists were, by statute, still in full control of formal medical education in the universities. Nevertheless, the moderns had managed to inject some new science into the curriculum. In the next century this foothold was constantly expanded, particularly at Cambridge, where three scientific professorships were added before 1710. Eventually scientific medical studies totally replaced the classics in the curriculum. This major revolution was a direct result of the beginnings made in the seventeenth century by the enthusiastic "new philosophers" — a reflection of the discoveries of a "century of genius."

Incubator and Taboo

ERWIN H. ACKERKNECHT*

It seems that as far as the problem of premature children is concerned, medical science from the time of Hippocrates down to the eighteenth century limited its efforts to discussions of the viability of seventh versus eighth month births. Christianity had brought about a new theoretical attitude toward child and fetus, and outlawed abortion and infanticide, but exerted no practical influence in this domain. The fatalistic attitude of John Hunter that nothing can be done for ill children is symptomatic of the state of things up to the eighteenth century. Though incubators for the eggs of fowl had been known already to the Egyptians, it appears that the systematic use of incubators for the conservation of the premature child started only in the middle of the nineteenth century (Dauncé of Bordeaux, 1857).

In view of the indifference shown and the difficulties encountered even by high civilizations in the upbringing of premature children, it is not surprising to see that primitives in general have developed no medical techniques in this field. Therefore, it is all the more remarkable that two primitive populations, the Eskimos and the South African Thongas, did invent contrivances for the care of premature children. Bogoras[1] describes the technique of the Asiatic Eskimos as follows:

A baby born prematurely is put into the soft skin of a big sea-bird. This skin, taken off whole and turned, has the feathers inside. Then it is tied up very securely, and hung over a big lamp in which a small flame is kept constantly burning. Of course, in doing this, they take care that the child's head shall be in a proper position. In this position the babe is kept for from a week to four weeks, during which time it is fed with small quantities of oil, as well as with mother's milk drawn from her breasts. Little by little the portion of milk is increased, and at last the babe is allowed to suckle.

H. S. Junod[2] reports from the Thongas:

When a child is born prematurely and is very small and delicate, he is wrapped

* Assistant Curator of Physical Anthropology, The American Museum of Natural History.

[1] Bogoras, W., The Chuckchee, *Mem. Am. Mus. Nat. Hist.*, XI Leiden, New York 1904–9, p. 514.

[2] Junod, H. A., *The Life of a South African Tribe*, London 1913, I, p. 40.

in the leaves of the castor-oil plant and put into a big pot, which is then exposed to the heat of the sun. This is a true incubator, and the treatment is said to be attended with success.

These facts are interesting enough in themselves to be worthy of emphasis. So far they seem to have escaped any special attention from the readers of the two classic monographs. Still more exciting is the question why among the hundreds of primitive populations observed by modern ethnographers, should these two, so different in culture, race, and geographical location, have made so momentous a discovery. Both populations are gifted in the field of techniques, but not more so than many others. As both have a high birth rate and as the Eskimos even practice infanticide, there seems to exist no special biological incentive for making such an invention. Climatic conditions cannot be instrumental in view of the great differences in the respective environments of both people. The only common denominator which can be found between them, and which is most likely to be a causative factor in the elaboration of this medical technique, lies in a quite unexpected field — in the field of taboo.

It is a well known fact that all over the world the sexual and reproductive functions of women are heavily tabooed because of their mysterious, awesome, and disgust, or fear-inspiring character. It is not improbable that this primitive attitude toward the female sex function is instrumental in the discrimination against women in cults and various other activities in primitive societies, all the more as such discrimination usually ceases when women have passed the menopause and become sexually neutral. Of almost universal distribution and surviving in a rationalized form in our society are the *taboos against menstruating women*.[3] Less common but still very widespread are the taboos against *pregnant women, women in childbirth and in childbed*.[4] *Yet only in a very few regions is miscarriage regarded as a particularly dangerous and, therefore, heavily tabooed event.* This specialization and elaboration of the usual birth taboos has been described only among the Eskimos, the South African Thongas and their neighbors, the Maoris, and

[3] For a list of such taboos see H. Webster, *Taboo*, Stanford University 1942, p. 82 ff. or D. McKenzie, *The Infancy of Medicine*, London 1927, p. 281 ff. There are nevertheless tribes which are indifferent toward menstruation: Trobriands (Malinowski, B., *The Father in Primitive Psychology*, New York 1927, p. 27); Veddas (Seligman C. G. and B. F., *The Veddas*, Cambridge 1911, p. 94); Hopi (Titiev, M., *Old Oraibi*, Cambridge, Mass. 1944, p. 16). Or even such where menstrual blood is regarded as containing curative powers: Ten'a Indians (Jetté, *Anthropos.*, 1911, *6:* 699); Ainu (Pilsudski, B., *Anthropos.*, 1910, *5:* 774); Arapesh (Mead, M., *Anth. Publ. Am. Mus. Nat. Hist.*, *37:* 345); Apache (Opler, M. E., *An Apache Life Way*, Chicago 1941, p. 98); Akamba (Lindblom, G., *Akamba*, Uppsala 1920, p. 40).

[4] See Webster, *l. c.*, p. 51 ff.; p. 54 ff.

the Bri-Bri Indians of Costa Rica. Boas[5] records of the Baffin Land Eskimos:

Cases of premature birth require particularly careful treatment. The event must be announced publicly, else dire results will follow. If a woman should conceal from other people that she has had a premature birth, they might come near her, or even eat in her hut of the seals procured by her husband. The vapor arising from her would thus affect them and they would be avoided by the seals.

Rasmussen gives a two-page list of restrictions which the unhappy Polar Eskimo woman has to observe for one year after a miscarriage.[6] Among the Polar Eskimos, as among the Baffin Land Eskimos, concealment of miscarriage and avoidance of taboo restrictions are said to produce famine.

If a woman keeps her miscarriage secret to avoid the severe penance entailed, she may either fall ill herself or she may plunge her compatriots into misfortune through failure of the fishery, or some assault of the forces of nature.[7]

The same ideas were expressed by the South African Thonga medicine man Maukhelu, who told Junod:[8]

When a woman has had a miscarriage, when she has let her blood flow secretly and has buried the abortive child in an unknown place, it is enough to make the burning winds blow, and to dry up all the land: the rain can no longer fall, because the country is no longer right. Rain fears that spot. It must stop at that very place and can go no further. This woman has been very guilty. She has spoilt the country of the chief, because she has hidden blood which had not yet properly united to make a human being. That blood is taboo! What she has done is taboo. It causes starvation.

Other tribes of the same region, such as the Ama Xosa,[9] the Ba Venda[10] and the Ba Ila,[11] entertain similar beliefs in the supernatural damage caused by miscarriage which has not been properly atoned for by all kinds of taboo restrictions and purification rites.[11a]

Elsdon Best (The Maori, Wellington 1924, vol. II, p. 5) reports the following attitude for the aborigines of New Zealand:

Cases of premature birth were supposed to have been brought about by the

[5] Boas, F., *Bull. Am. Mus. Nat. Hist., 15:* 125.

[6] Rasmussen, K., *The People of the Polar North*, London 1908, p. 120.

[7] *Ibid.*, p. 128. For other Eskimo taboos on miscarriage, see Weyer, E. M., *The Eskimos* New Haven 1932, p. 377.

[8] Junod, *l. c.*, II, p. 317.

[9] Soga, J. H., *The Ama-Xosa*, Lovedale 1931, p. 300.

[10] Stayt, H. A., *The Ba Venda*, Oxford 1931, p. 90.

[11] Smith, E. W. and Dale, A. M., *The Ila speaking tribes of Northern Rhodesia*, London 1920, II, p. 6.

[11a] A very similar combination of miscarriage fears and bringing up of premature children in clay pots is reported from the neighboring Akamba (Lindblom, l.c., pp. 32, 34, 283).

mother having infringed some law of tapu. . . . An immature birth is always a danger to the community, for its nairua (spirit) may develop into a atua kahu, a malignant demon delighting in harassing man. . . . A rite to lay the demon spirit was sometimes performed over the spot whereat the foetus had been buried.

Among the Bri-Bri Indians of Costa Rica, a woman who has had a miscarriage is not only secluded, but is considered so dangerous that all contact with things she has used is avoided, and her food is passed to her on the end of a long stick.[12]

These are the only relatively well documented cases of belief in the particular dangers of miscarriage. Apparently similar notions exist or have existed, especially in South America, which we ignore only because of the incompleteness of our records. It is controversial whether the South American Mojos killed women who had a miscarriage.[13] Tapuya women are reported to devour miscarriages. Burial of miscarriages in special vessels in ancient Troja instead of the usual cremation, is equally suggestive of special taboos.[14]

It is not difficult to understand that people who are so much in fear of a miscarriage would be interested in avoiding it, at least in some of the cases, by attempting to bring up the premature child. And, as a matter of fact, in two out of the four known cases of such belief, an appropriate method for nursing premature children was invented. As far as the Bri-Bri Indians are concerned, our records tell nothing of such a method; but the records are so extremely scanty that this by no means constitutes positive proof that the Bri-Bri had not worked out some similar idea.

Why the Eskimos, Thongas, Maori, and Bri-Bri taboo just miscarriage so severely is as unknown as the reason for most taboos. That these tribes have centered their fears around abortion is rather surprising in view of the fact that abortion is one of the very few pathological phenomena which to most primitives has no supernatural implications.[15] The practice of artificial abortion is almost universal among primitives, forbidden by many, but actually punished only by very few (Ama Xosa, Battak).[16] As in certain cases of infant mortality[17] or venereal disease,[18] it is perhaps the

[12] Pittier de Fabrega, H., *Sitzgsber. phil. hist. Classe Kais. Ak.* Wien, *138:* 20, 1898.

[13] Métraux, A., *Native Tribes of Eastern Bolivia and Western Matto Grosso*, Washington 1942, p. 70.

[14] Ploss, H. and Bartels, M., *Das Weib in der Natur- und Völkerkunde*, Leipzig 1908, I, p. 839.

[15] McKenzie, *l. c.*, p. 316. See also Fortune, R. F., *The Sorcerers of Dobu*, New York 1932, p. 240.

[16] Ploss-Bartels, *l. c.*, I, p. 843 ff.

[17] Fortune, R. F., *Manus Religion*, Philadelphia 1935, p. 74; Evans-Pritchard, E. D., *Witchcraft, Oracles, and Magic among the Azande*, Oxford 1937, p. 478.

[18] Opler, *l. c.*, p. 227.

very commonness of the phenomenon which deprives it of its supernatural character.

The sociological and economic importance of taboos has been increasingly recognized by ethnographers. "The natives understand how our own legal system is imposed with the help of rifles perfectly. They say typically 'You have your rifles — we have tabu, witchcraft and sorcery our weapons'."[19] In health matters taboos are sometimes so useful that they have been regarded wrongly as conscious health measures, "the fallacy of sanitary intention" as Crawley called it, such as the taboo against sexual intercourse during the nursing period, the hiding of excrement for fear of magic, etc. But in general they are, at best, physically indifferent. Often taboos are directly detrimental to the bodily well being, like the mourning taboos of Eskimos which produce famine in time of scarcity, the tabooing of the colostrum among many primitives, taboos against bathing at Nias, etc. In any case, taboos in general are by their very nature obstacles in the way of inventions. This is particularly striking in the field of primitive surgery which is so poor not because primitives lack technical skill, but because of their supernatural beliefs. In our case, paradoxically enough, a taboo seems to have provoked a technical invention in the medical field. This observation seems to complement my earlier analysis of primitive autopsies[20] where I showed that primitives in spite of dissecting continuously gain no anatomical knowledge because of their mental unpreparedness.

These minor examples from the field of primitive medicine emphasize that medical discoveries often owe their existence to "ideologies" rather than to mere experience.[21]

[19] Fortune, 1932, p. 157.

[20] Ackerknecht, E. H., *Bull. Hist. Med.*, 1943, *13:* 334 ff.

[21] Galdston, I., *Bull. Hist. Med.*, 1939, *7:* 729 ff.

Animal Substances in Materia Medica

A STUDY IN THE PERSISTENCE OF THE PRIMITIVE

LOREN C. MacKINNEY*

THROUGHOUT the successive civilizations known to history, medical men have tended to cling stubbornly to ancient superstitions. This is especially true in the field of materia medica. During periods of brilliant human achievement, such as the age of Periclean Greece, Augustan Rome, the Renaissance, and the Enlightenment, materia medica has manifested characteristics strikingly similar to those of the intervening ages of disintegration, barbarism, and so called "darkness." There is little ebb and flow in the basic folk practices which dominate the processes of making and taking medicines. The most enlightened ages display superstition, magic, and revolting remedies that are comparable to those of less cultured periods. Amid the much lauded civilizations that produced the pyramids, the Hippocratic Oath, Platonic philosophy, Vergilian poetry, the Divine Comedy, and the Sistine Madonna, professional healers as well as folk practitioners employed a materia medica that smacked of primitive times and age old superstition. This is not to deny that great physicians such as Hippocrates, Galen and Paracelsus made scientific contributions in certain lines of medical practice. Nevertheless, in the realm of materia medica, even the outstanding men of the profession have manifested astonishing subservience to the superstitious traditions of the past. Until comparatively recent times, in all ages and regions, the great mass of humans has relied on much the same magical and empirical methods of healing as were practiced by their remote ancestors.

In the elucidation of this theme we shall deliberately turn our backs on the more scientific aspects of medicine, restricting our survey to medicaments. Furthermore, within this realm, which comprises simples and compounds composed of vegetable, mineral, and animal substances, we shall restrict ourselves to the last mentioned, those from animals (including

* The University of North Carolina. Professor MacKinney's article was written originally for presentation at the VII National Congress of Medicine at Buenos Aires under the title "Substancias animales en la Materia Medica."

humans). Furthermore, we shall restrict our historical survey to a few periods of outstandingly high civilization. Our general purpose is to emphasize and elucidate the often unrecognized fact that fundamentally primitive types of medicine persist in the medical practice of highly civilized, as well as of backward, peoples.

The popular inference that disgusting animal substances and naive practices are peculiar to the materia medica of primitive folk, orientals, and Europeans of the "dark ages," is without justification. Surveys of the medicaments used in the past show that, whereas compounders of medicines have invariably used vegetable, animal, and mineral substances, animals are less prevalent than herbs, and more prevalent than minerals. Only in the late modern age has there been any marked decline in animal materia medica, and recently, with the increased application of chemistry to medicine, such materials have regained some of their popularity. Whereas the physician in bygone days employed animal substances in their natural state, his modern successor gets them from a vial in the form of a tested pharmaceutical essence or compound, such as plasma, hormones, or some such glandular extract.

As far back as detailed records are available, men seem to have used animals for healing. At the dawn of recorded history it is known that man often ate, or wore on his person, some portion of an animal that was thought to have a healing or protecting influence. We tend, of course, to brand as pure magic and superstition, primitive customs such as devouring the heart or drinking the blood of a defeated enemy, or eating an animal's testicles, liver, spleen, or brain in order to strengthen the corresponding human organs; or imbibing human and animal excrement, saliva, teeth, ground bones, and the like. On the other hand, the use of the grease of a poisonous animal as a preventative of poison suggests that our remote ancestors may have stumbled upon a valid principle of immunization. Nor is the use of poultices containing dung, grease, urine, etc., or of potions containing internal organs or secretions, to be dismissed as mere nonsense. A modern age of scientific medicine which has suddenly discovered medical values in all sorts of queer substances, and marvelous qualities in liver, kidneys, snake virus, and maggots, should be slow in condemning as pure magic and superstition the organ therapy, and similarly primitive practices of the past.

Despite our approval or disapproval, the fact remains that otherwise intelligent people of ancient civilizations have put their trust in such remedies. The Chinese have for ages relied on animal substances. In addi-

tion to the ordinary internal and external portions, they used the grease, excrement, placentas, semen, testicles, gizzard, etc., of various animals and sometimes of humans. The Hindus did not employ animal substances as much as the Chinese, but the difference is merely one of degree. In like manner, the exceedingly scanty records of early civilizations in the Tigris Euphrates valley reveal the use of animals as materia medica.

Egypt

Although animal substances were not so numerous as those of vegetable origin in the materia medica of the Egyptians, nevertheless they played an important role in healing. There are very few extant records of medical practice in ancient Egypt, but among those that have come to light in recent years is a valuable collection of materia medica known as the Papyrus Ebers. Although this treatise was compiled in the sixteenth century B.C., it contains many remedies from earlier centuries, some of them dating from the age of the pyramid builders.

Of the eight hundred or more prescriptions in the papyrus comprising various herbs, animals, and minerals, a considerable number contain matter derived from birds and beasts both wild and domestic, from insects, reptiles, and fish. From these animals, a variety of materia medica was derived, ranging from the natural products (milk, eggs, etc.) and excrements of living animals, to the bones, blood, flesh, fat, marrow, and hide of carcasses, and in certain cases special substances such as the feathers of birds, the shell of the tortoise, the quills of the porcupine, the slough of snakes, and dirt from under human fingernails. In the case of insects, worms, and small animals, often the entire body was used; of ordinary animals, only small portions were used; the head, hair, horns, brain, eyes, teeth, jawbone, heart, liver, spleen, gall, uterus, vulva, testicles, legs, feet, hoofs, etc. By all odds the most favored substance was the grease, or fat, particularly of the goose and ox. In over a hundred recipes greasy substances were employed; in some cases, however, as a vehicle, rather than as the active ingredient. Second in importance were the excrements which were employed in about half as many prescriptions.

The varying forms in which animals were employed correspond to those common to all types of materia medica in all ages. All prescriptions (whether vegetable, animal, mineral, or combinations of the three) can be considered in one of two major categories; internal medicines comprising either liquid potions or solids in the form of pills, foods, and the like; and external medicines comprising ointments, salves, plasters, and poultices.

There are also miscellaneous types, such as inhalations, fumigants, gargles, enemas, and suppositories.

Of some eight hundred prescriptions in the Papyrus Ebers, the majority are external medicines for specific localized ailments such as burns, wounds, ailing eyes, skin eruptions, stiff or aching joints, and bald heads. Many of the remedies were applied, apparently with the practical intelligence of long experience. Others reveal the most haphazard methods of diagnosis, and application. The following recommendations may be cited as examples of the less rational type. For impotence, the penis might be bandaged with a poultice containing thirty seven ingredients, among which were ox grease, goose grease, and pig dung, six kinds of sawdust, four herb juices, other vegetable substances such as onion, watermelon, beans, etc., and several minerals. In cases of priapism, "to soften elevation of the male member, myrtle, grease, spleen of ox, frankincense, and beans" were recommended, in the form of a poultice. For scalp trouble there is the following combination of animal substances and magical ritual: "The blood from the backbone of a raven is added to real laudanum and [the scalp] is anointed therewith. Then he [the patient] shall lay his hand upon the back of a live kite, or swallow, and he shall apply [his hand] to his head."

Not all of Egyptian pharmacy, however, runs to such unintelligent extremes. It is noteworthy that only twelve of the approximately eight hundred recipes of the Papyrus Ebers contain magical incantations. This fact rather effectively disposes of the traditional condemnation of Egyptian practitioners as merely "magicians contending with a demon infested world." Along with superstitious elements there is much that shows rational judgment based on practical experience. The combination of physiological treatment with the psychological therapy inherent in superstitious and magical practices is well exemplified in the unusually large assortment of remedies for gray hair, baldness, and other forms of scalp trouble. Out of a total of thirty-seven such prescriptions, the great majority are ointments most of which contained greasy substances. Such treatments must have had some efficacy, for they have been time tested hair remedies, even down to our own day when greasy substances, ranging from snake oil to perfumed pomades, are sold to old and young, male and female, who seek luxuriant and glossy hair. One such hair restorer of Egyptian times was compounded from the grease of six animals; the lion, hippopotamus, crocodile, ibex, serpent, and cat. Less complicated were those that consisted of grease and a single other ingredient such as turpentine, oil in

which a gazelle's horn had been boiled, burned porcupine quills, the blood of a black calf or ox, or the blood from the horn of a black ox. In such remedies, it is obvious that the grease rubbed into the scalp was the effective remedy, whereas the ingredients derived from animals with *black* hair, horns, or quills, were of merely psychological value. By and large, Egyptian hair remedies contained a high proportion of animal substances.

The remedies for eye trouble differ from those for the hair in that animal greases and dung were less used than honey and milk, notably "the milk of a woman who has borne a male child." There is also in these remedies a high proportion of magical practices. The use of the gall of men and animals, of urine, blood, brains, eyes, and other such animal substances is common, especially in the section devoted to the removal of hairs from eyelids. A single prescription contains the blood of oxen, asses, pigs, goats, and hounds; also lizard dung, stibium, and malachite. Occasionally one finds positively dangerous practices such as applying finely ground and strained granite or flint to ailing eyes. On the other hand, "liver of ox, roasted and crushed," recommended as "really excellent" for night blindness, is in keeping with advanced practice.

The recommendations for the treatment of wounds, likewise reveal therapeutic characteristics. The affected member was usually bandaged with a compound including animal grease as well as vegetable and mineral substances, and sometimes animal dung or urine. The application of fresh meat, grease, and, less often, ox dung, is indicated in the Edwin Smith Surgical Papyrus. In cases of stiff or aching limbs, concoctions of vegetable, animal, and mineral matter were applied in which there was usually some sort of grease, and sometimes the dung or part of the body of an animal. An unusually high proportion of animal substances is exemplified in a poultice (for a pulsating limb) which contained "ox beef, spleen, Northern salt . . . wheat, dragon's blood, grease of ibex, and brain of ox." As an extreme of unintelligent and haphazard treatment we cite a recommendation for the relief of pain "in all of a man's limbs: . . . ammi, styrax, honey, precious malachite, and dog's excrement are applied to his face; do not lay hands on him."

Animal substances were of less importance in internal remedies, although milk, honey and goose or ox grease were used in potions for ailments of the stomach, kidneys, and intestines; beer, however, was a more popular liquid vehicle. Animal greases and grains were much used in suppositories and rectal injections, where their lubricating properties were of value. As *basic* medicaments for internal ailments, animal substances

were little used. Startling, but exceptional, are the recommendations of ass's testicles for epileptics, the dung of the crocodile and of certain birds for asthma, goose grease or the heart of certain birds for tape worm, and ground pig's teeth in cakes for coughing. In this respect the Egyptian pharmacopoea contains fewer revolting remedies than the writings of the Greek Dioscorides, the Roman Pliny, and many of the medieval European handbooks of materia medica. Magical incantations are conspicuously lacking, an exception being a charm which accompanied a recipe for diarrhea. On the other hand, there is also a lack of fundamentally therapeutic practice. Again an exception, proves the general rule: the recommendation of liver for night blindness. This curiously modern remedy is to be noted in almost every extensive pharmacopoea of ancient times.

It is apparent, from our brief survey of animal materia medica in the Papyrus Ebers, that the Egyptians made use of animal substances chiefly in external medicine. The major function of these substances seems to have been practical and intelligent; to provide a greasy vehicle for other medicaments. Less prevalent, though more shockingly apparent, was the use of other animal substances in ways that impress the modern world as useless, if not actually revolting. Until comparatively recent times, medical historians have been so impressed by these spectacular factors that they have perpetuated the legend that the medical practices of the Egyptians, like those of all pre-Greek people, was a mass of Oriental magic. Some have gone so far as to charge the Egyptians with responsibility for the disgusting animal remedies which were used in succeeding ages.

In our opinion, recent researches in the Papyrus Ebers and other sources refute such pessimistic opinions and make it mandatory for twentieth century scholarship, including the medical profession, to abandon or drastically modify past judgments concerning Egyptian medicine. To be specific, we can brand as false assertions such as the following (in a paper read before the American Historical Association in 1919) to the effect that Egyptian medicine was mainly a collection of "incantations and weird random mixtures of roots and refuse." Similarly inaccurate are the opinions of another historian to the effect that the Egyptians were particularly fond of those animal substances "connected with the organs of generation . . . or those which were recommended by their nastiness," and that disgusting animal substances were merely a support for magical conjuration. On the other hand, there is need for caution against going to the opposite extreme and accepting overly enthusiastic opinions which would place

Egyptian medical practice on a par with that of the Greeks and dethrone Hippocrates in favor of Imhotep as the father of scientific medicine.

The dominant characteristic of Egyptian materia medica is neither its rational modernness nor its revolting primitiveness, but rather a certain all inclusiveness that defies any final stamp of either approval or disapproval. It is a complex comprising much both of primitive superstition and of rational experimental science. The superstition and magic, which was doubtless widespread during the earlier millennia of Egyptian history, persisted in the folk practices of later times, as is recorded in certain sections of the Papyrus Ebers, which was compiled in the sixteenth century B.C. But the same papyrus, and the Edwin Smith Surgical Papyrus from the same period, also reveal certain pharmaceutical and surgical practices of a very high order. Between these two extremes falls the great mass of recipes of the Papyrus Ebers, and also of Egyptian materia medica, which manifested a rather simple reliance on home remedies and non-professional practices. The animal, herbal and mineral substances were such as could be procured easily; their preparation and application was likewise relatively simple. This, we believe, was a materia medica of folk healers and lay practitioners rather than of priest-physicians, professional pharmacists, or any other type of specialist. It is this characteristic that makes materia medica so strikingly similar among all civilized peoples of the past. In the realm of popular, every-day folk medicine, there is little choice between the materials and methods of the Chinese, Hindus, Egyptians, Greeks, Romans, and medieval or early modern Europeans.

Greece

Historical tradition has it that the medical science of the Greeks stands in marked contrast to the so called magic and superstition of the Orient. At first glance this seems to be corroborated by a comparison of Greek and Egyptian materia medica. This contrast is particularly impressive if one thinks of Greek medicine solely in terms of the Hippocratic writings, and if the Coan treatises are considered as the true expression of Hippocratic medical science. In these works materia medica in general, and animal substances in particular, are conspicuously lacking, medical practice being based on the theory that nature should be allowed to take her own course with little resort to drugs. But other Hippocratic treatises criticized those physicians who neglected to use medicines.

As a matter of fact, certain of the latter type of Hippocratic works re-

veal a materia medica that is akin to that of their Egyptian predecessors and Greco-Roman successors. They contain prescriptions that show striking likenesses to portions of the Papyrus Ebers, and their materia medica is quite extensive, especially in cases of female ailments, for which animal substances were frequently employed. Although the Hippocratic writings contain no formal pharmacopoea, there are scattered references to over three hundred substances. A considerable number of these are from animals similar to those noted in the Papyrus Ebers. The specific portions used are likewise similar to those of ancient Egypt. In addition to grease, horns, gall, liver, sweat, and excrements, the entire body was used in the case of small animals, worms, crawfish and the cantharide beetle. Human urine and the placentas of women were also employed. Since Hippocratic medical science relied heavily on nature and normal bodily processes, regimen, which included diet, was stressed far more than materia medica. In the field of diet, animal substances were prominent, though by no means dominant. Book II of the *Regimen* sets forth the medical qualities (laxative, dry, warm, etc.) of various meats, fish, fowl, and of animal products such as milk and eggs.

Obviously it is a mistake to infer that the medical practice of classical Greece maintained itself at the high level that is set forth in the most scientific of the Hippocratic treatises. Professor Thorndike, in his *History of Magic and Experimental Science* (I, 21), has shown the fallacy of exaggerating "the limpid Hellenic genius" and the "clear light of Hellas" to the point of denying the existence of superstition and magic in ancient Greek civilization. In everyday practice, the average Greek practitioner relied on something more than Hippocratic rationalism. He must have had hand books of recipes much like those found in the Papyrus Ebers and the *Materia Medica* of Dioscorides. This assumption is justified by the extant Greek handbooks from later centuries. During the Alexandrian period physicians of the empirical school stressed the use of drugs, and in the third century B.C. Serapion compiled such a complete pharmacopoea of accused him of having revived and foisted upon the Roman, medieval, and early modern world the revolting materia medica of ancient Egypt. Obviously he merely collected and presented in usable form the materials and practices of his own age, regardless of their origin.

There is no denying the fact that the later Greek writings on medicine contain more of primitive remedies than those of the age of Hippocrates. This same phenomenon, the increase of superstitious prescriptions as a civilization grows older, can be seen in other periods, notably ancient

Egypt and medieval Europe. This fact, however, does not justify the conclusion that medical science gives way to superstition, as a civilization ages. It seems that most civilizations record their customs in greater detail as they grow older. Thus the writings of later centuries contain an ever enlarging accumulation, not only of science, but also of superstition, including that handed down from earlier times. Obviously, then, much of the nonsensical and magical material in a late compilation of materia medica is derived from more primitive ages. The Papyrus Ebers contains recipes from earlier periods. The same is true of the *Materia Medica* compiled by Dioscorides in the later era of Greek civilization.

The works of Dioscorides, a Greek soldier and traveler who wrote in the age of the Roman Emperor Nero, provide our most detailed collection of Greek materia medica. Although the greater portion of his five book treatise Περὶ ὕλης Ἰατρικῆς concerns vegetable substances, almost half of book II is devoted to materia medica from animals. Starting with aquatic creatures, he discussed the medical properties of each of a number of fish, shell fish, insects, domestic animals, birds, and larger animals; this is followed by a description of the uses of milk, cheese, butter, wool, wax, honey, fat, and of more revolting animal substances such as marrow, gall, blood, and the excrements. In the case of insects, worms, and certain smaller animals, often the entire body was crushed, dried, burned, or cooked and applied in the form of a powder, salve, poultice, or potion. Noteworthy among the remedies for both external and internal use, were those made from cantharid beetles, grubs, earthworms, millipedes, roaches, and bugs of various sorts. For example, cockroaches ground up in oil were applied for ear ache. Millipedes, taken internally with wine, were recommended for epilepsy and kidney trouble, with honey for throat trouble, and when ground up with certain herbs and applied directly, they were supposed to cure tooth ache. Various portions of larger animals were used in equally varied fashion; among them the brain of a chicken, the tusk of an elephant, the hoof of an ass or goat, or internal organs such as the liver, gall bladder, bones or marrow, and testicles. More prominent, however, are substances such as grease, and to a lesser degree blood, excrement, sweat, and other such matter from man or beast.

The animal simples and compounds described by Dioscorides were applied in the pharmaceutical forms that have prevailed in all ages. Externally they were used as ashes or powders, salves or poultices, and liquid ointments; internally as foods, medicinal solids, and potions. As in the case of the Papyrus Ebers, and also Pliny's *Natural History* (which will be con-

sidered later) Dioscorides' materia medica comprises extremes of revolting superstition and common-sense empiricism. Among the many ridiculous or shocking remedies, are the following: a lizard's liver applied to an aching tooth; the part of a land crocodile that surrounds the kidney, taken with wine, as an aphrodisiac, whereas the same, taken with honey and water was used for the opposite effect; a person who had been bitten by a mad dog was urged to eat the roasted liver of the same dog, to avoid hydrophobia. Most astonishing of all are the recommendations of excrements of all kinds, including those of humans, used either internally or externally for a variety of ailments.

On the other hand, there are innumerable common-sense practices. Most noteworthy are the use of greases, especially as external ointments or salves to sooth irritated surfaces. The use of goose grease, of castoreum, and of raw flesh on wounds, are interesting reminders of Egyptian practices. The warm flesh from a recently killed chicken was applied to snake bites, and a lizard's head was used for drawing out slivers or anything imbedded in the skin. Among the many other remedies that have some hint of practical usefulness, are various applications of honey, the use of egg white for eye trouble, and the correction of internal disorders, such as ulcers, by means of milk.

In general, the dominant characteristic of Dioscorides' materia medica is its general similarity to the Papyrus Ebers with regard to substances and animals used, forms of medicaments, and methods of application. If, as seems likely, these two works were typical of the remedies of the Egyptian and Greek worlds respectively, we have in them remarkable evidences of continuity in man's use of animal substances for healing. We shall find further corroboration of this hypothesis in our survey of Pliny's *Natural History*.

ROME

Among the Roman writers on medicine two are outstanding: Celsus and Pliny the Elder. Although both wrote their medical treatises as parts of general encyclopedic works, and although it is not certain that either was a professional physician, they provide noteworthy evidence as to materia medica in the Roman Empire. Celsus presents the more rationally scientific treatment, Pliny's account being little more than a survey of popular remedies. Thus, in a sense, Celsus and Pliny provide us with somewhat the same varied viewpoints that the Hippocratic writings and Dioscorides provide in the case of Greek medicine. In fact, Celsus has been called "the

Roman Hippocrates," and Pliny might well be designated "the Roman Dioscorides."

Like Pliny, Celsus lived and wrote during the first century A.D., in the heyday of the Empire, when Roman medicine was at its highest point of scientific development. Although Celsus' *De Medicina* deals with all phases of medicine, and approaches the subject from a scientifically professional viewpoint, it emphasizes the importance of materia medica in a manner that is closer to Dioscorides and the Papyrus Ebers than to the Hippocratic writings. To be sure, as in the last mentioned works, medicaments are considered as auxiliaries to other healing methods, and are recommended in restrained scientific terms. Nevertheless, Celsus repeats many of the familiar old remedies; greases for poultices and salves, cantharides used externally as a caustic, and internally as an antidote, castoreum for various ailments, goat liver for night blindness, also egg white as an eye salve; and more primitive substances such as dung, urine, and blood, for various ailments. There is even a recommendation of gladiator's blood, drunk while still warm, for epilepsy.

Practically the same characteristics are observable in the works of the Graeco-Roman, Galen, who served as private physician of the Roman Emperor Marcus Aurelius, about a century after Celsus. Galen was the inheritor, interpreter, and also the transmitter to the Roman world, of Hippocratic medical science, but nonetheless his works manifest the prevailing reliance of both Greeks and Romans on materia medica, including the age old superstitions. Galen compiled the materia medica of his Greek predecessors and Roman contemporaries in an eleven-book treatise *Concerning Medical Simples*, two of the eleven books of which are devoted to animal substances. In other treatises he dealt with compound medicines and the various drugs that were useful for ailments of the head, torso, extremities, etc. The outstanding characteristic of Galen's materia medica is the high proportion of complicated recipes. This trend to "polypharmacy" is traceable to the late Greek medical science of Hellenistic Alexandria. Its influence was noticeable at Rome in the first century A.D. when Emperor Claudius' physician, Scribonius Largus compiled a popular handbook containing some three hundred complicated prescriptions strongly tinged with superstitious practices.

It is noteworthy that, by this time, Greek medicine was known, and resented, by Westerners. Many Romans were convinced that the medical profession was being ruined by money-seeking quacks from the Greek East. In like fashion many prejudiced minds have charged to Egyptian and

other Oriental influences, all unscientific practices found in Greek medicine. And our modern age, in turn, still brands as "medieval" all practices of which we disapprove. Thus mankind instinctively tends to disavow the more primitive elements of his environment and heritage.

From the standpoint of animal materia medica Pliny the Elder's *Natural History* has been more influential than most of the works considered thus far. In fact it is one of the most comprehensive of all sources of information concerning the materia medica of the ancient world. Pliny wrote in Rome, at about the middle of the first century A.D. Out of eighteen books in his *Natural History* which deal with materia medica, books XXVIII, XXIX, XXX, XXXI and XXXII are devoted to animal substances. The wealth of detail presented therein is not merely a cross section of remedies used in Rome in the first century; it is a compilation of all ancient materia medica. Pliny's material, as is evident from his citations of ancient writers, was derived from Greek and other Eastern sources, as well as from those of the Latin West. Because of the lasting popularity of the *Natural History* throughout the Middle Ages, these remedies from bygone ages and distant regions were current in Western Europe well into modern times.

It was once the fashion among historians of medicine to characterize all disgusting remedies as "typically medieval" and to attribute them to the barbarism of the "Dark Ages." Since twentieth-century scholarship has traced many of the most disgusting remedies of medieval medical literature to the pages of Pliny, there has been a tendency to shift much of the onus of superstition in medicine to the Romans. But the fact that the *Natural History* is itself a compilation that draws heavily on earlier Eastern sources, makes it clear that the Romans were not the originators of this medical lore. Nor can one charge the Greeks with being the founders of medical superstition. The finger of suspicion which once pointed to the Egyptians, likewise wavers under the weight of evidence from medical papyri. It must be evident to the informed and unprejudiced mind that every age has in its materia medica much that later ages consider superstitious. Such elements, along with many other customs, are a part of the universal folk practices of the mass of humans, even when living in civilized society. Regardless of the progress of the upper stratum of medical scientists, the practices of folk medicine persist among the masses. They are carried over to later ages by word of mouth and by the written word. They are modified, and amplified by new accretions, some of which are recorded, much of which persists in the oral tradition of folk medicine. A Hippocrates, a Celsus, a Galen record comparatively little of this folk practice in their

formal treatises. Surgeons, specialists, and trained professionals keep it in the margin of their consciousness and practice. Occasionally a medical man, such as Dioscorides or the author of the Papyrus Ebers, will write a handbook in which popular remedies are roughly organized for the use of everyday practitioners. Only rarely is there a diligent lay encyclopedist, like Pliny, to codify the mass of remedies, that for centuries have been recorded by writers, practiced by quacks, magicians, and midwives, and resorted to by the masses everywhere.

Although Pliny's work partakes of the same general character as the Greek and Egyptian books of materia medica, he transcends them in quantity and effective organization. By way of comparison, the prescriptions of *all* types in the Papyrus Ebers would fill about a hundred printed pages. Dioscorides' material on solely animal substances would be approximately the same in amount, while Pliny's animal materia medica totals about three times as much. Pliny presents, after the fashion of Dioscorides, the distinctive medical properties of each important animal, with additional sections concerning remedies from humans, the larger wild animals, domestic animals, serpents, insects, birds, aquatic animals, etc. There are also brief summaries of the values of especially important substances such as milk, cheese, butter, grease, marrow, gall, and blood.

The superior quantity of material in Pliny is evident from a listing of the classes of animals mentioned. In addition to man, twenty or more wild beasts are considered; they range from the elephant, camel, and hippopotamus to the ape, fox, badger, and hare; also all of the common barnyard animals, including the dog and cat. Among the smaller animals are various serpents and reptiles (especially lizards), also rodents, snails, bats, worms, bees and insects of all kinds, including cantharide beetles, flies, ants, and even "ticks from a dog's ear." Birds are unusually well represented, both the wild variety and the usual barnyard fowls. Of aquatic life, there are fish and other sea animals; and with them the much used frog, crab, tortoise, and beaver.

From man himself, an astonishing number of substances are listed. The use of some of them is reminiscent of primitive cannibalism; e.g., blood, viscera, and marrow, taken internally. Similarly revolting is the internal use of excrements, women's monthly discharges, and sweat scrapings. Less obnoxious are external local applications of the same substances, and of burned hairs, semen, teeth (either whole or ground to a powder), and water in which feet have been washed. The same sort of materials were obtained from animals, though in much greater number. The entire bodies of

shell fish and small animals were used, alone or in compounds, internally in potions or externally in poultices, salves, ointments, and the like. Parts of carcasses were also used; even the heads, legs, and wings of insects as minute as flies, and small sections of bugs and worms. Of the larger creatures, almost every member was employed in some form or other.

Internal organs were even more popular; they range from the brain to the viscera and genitals. Products or secretions of internal organs were also much used; among them the gall, semen, urine, and other excrements. Among the less objectionable products were rennet, honey, wax, milk from various animals (also from women), butter, cheese, and eggs (even those of ants). Such substances were recommended not only as foods, but also for their medicinal values. White of egg, for instance, was used as an eye salve, butter as a greasy ointment, and milk both internally and externally as a medicament. Blood, from creatures as widely different as the elephant and fly, was much in evidence. Among the less common, but more ridiculous substances, are foam from the mouth of a horse or mad dog, stones from the gall, kidney, and bladder, glue or gravy concocted from various parts of the carcass, lights, lichens from horses' hoofs, sinews, milt, caul, and even dog vomit.

Although it is impossible to give typical remedies from so large and varied a collection, we can at least present examples of the extremes of revolting, as against common-sense, practice; also of the varied forms in which simples and compounds were applied internally or externally. It is noteworthy that, as in most ancient materia medica, the external remedies are more numerous than the internal; likewise they are generally less revolting to the modern mind. It is well to give careful attention to these more normal types of remedies, for in spite of their wider prevalence, they tend to be eclipsed by the more spectacular minority of ridiculous or disgusting prescriptions.

At best, many of Pliny's external remedies are not bad. The most fastidious person will not be shocked to learn of the frequent use of the following substances, externally, in the form of liquids, semi-liquids, or powders: butter as a rubdown for pains in the neck; bear grease mixed with alum for chilblains; beef grease and powdered frankincense for corns; burned goat skin ashes and goat oil for feet tortured by tight shoes. Others are a bit more disconcerting: burned camel dung, applied locally, to stop dysentery; or the same, mixed with oil, to make the hair curl; hyena gall as a preventative of hair growing in the eyelids. Certain external remedies are absolutely nonsensical and disgusting, at least to modern folk.

To soothe a gouty member, hyena vertebrae were burned, the ashes placed in hyena skin along with bull's gall and the tongue and right foot of a sea calf, the entire mess boiled and the concoction applied locally. To prevent hair from turning grey and to make it grow luxuriantly, one might apply the genitals of an ass's foal burned to ashes and mixed with urine, "nard being added to make the mixture less offensive." Women might keep their breasts firm by applying "a concoction of wax, cadmia, and ashes of burnt partridge eggs." Offensive odors from the armpits were allayed by applying blood from a lamb's amputated testicles. One might multiply the examples of such external remedies involving varying degrees of superstition; and likewise of those indicating a degree of practical therapy.

Certain substances were used both internally and externally. Some of these (notably blood, excrement, and beavers' testicles) which seem most revolting at first glance, have been listed in modern pharmacopoeias as medically effective. Castoreum (beaver's testicles), for instance, was used with varying degrees of rational precision, as a laxative, narcotic, emmenagogue, antidote, or fumigant, in suppositories, ointments, electuaries, and potions. As in modern times, it was recommended for female hysteria and uterine ailments. According to Pliny, when used as an antidote "to neutralize a poison," it might be taken with wine, or with honeyed wine "if it is intended to be brought up again." Applied externally with honey "it improves the eyesight," and with vinegar "it arrests hiccough." It also appears in more complex compounds such as the following electuary for epileptics: Castoreum "bruised to the consistency of honey and mixed with vitex seed, vinegar, and oil of roses."

Whatever one's instinctive reaction to Pliny's *external* medicaments, many of them comprised substances or methods of application that had therapeutic potentialities. His recommendations of strictly internal medicines are, on the whole, much less convincing. The most rational of them are the laxatives and constrictives. To loosen the bowels, mare's and goat's milk were used, also castoreum, and certain types of sea creatures. For the contrary effect, boiled cow's milk and cheese were recommended, along with other substances. Among the recommendations that reveal something of rational practice are the following: milk, especially that of cows, "for all kinds of internal ulcerations," and also as an antidote; asses' milk as a throat gargle; liver for liver complaints, and the age-old use of liver for night blindness.

In general, however, the internal remedies appear to be a haphazard mass of medicines most of which might be used for any sort of ailment.

Even the most understanding mind, must be upset to find that the same substances or animals were employed for contradictory purposes. Rennet of hare, and also the liver and blood of various animals, were used for both relaxing and constricting the bowels; the only apparent distinction being that certain of these substances were relaxing if derived from a *she*-goat, but constricting if from a *he*-goat. One of the most ridiculous examples of double usage is the hint that the ashes of a burned lizard, wrapped in linen, would serve as an aphrodisiac when held in the *left* hand, but as an ant-aphrodisiac when held in the *right* hand. Similarly, the right testicle of a cock attached to the body with ram's skin, was supposed to work as an aphrodisiac, whereas the opposite effect was obtained by binding on both testicles of a game cock, rubbed with goose grease. In fairness to Pliny, it should be added that he expressed doubts concerning many such remedies. Potions containing whole insects appear often; they might contain worms, to promote conception; ants or spiders, for bites of poisonous insects; red flies, to cure epilepsy. Liquid medicines far outnumber solids, but there are numerous examples of medicinal foods, pills, and powders which were usually taken with honey, water, wine, or vinegar. For instance, nine pellets of hare's dung, taken in a liquid, would keep a girl's breasts firm; the ashes of a burned lark's beak, taken in a potion with myrrh, would prevent drunkenness, while owlet's eggs, eaten for three days, absolutely cure the drink habit; the eye of a hyena taken with licorice and dill would cause a woman to conceive, and this was "guaranteed within three days."

Most astonishing and amusing of all Pliny's recommendations are those which rely on magical influences, by means of amulets or charms, usually worn on the patient's body. Such were especially noticeable in the case of aphrodisiacs, two of which have already been mentioned. For the same purpose, a man might rub his genitals with the grease of an ass or gander, with the boiled testicles of an ass, or with dirt moistened with urine passed by a bull after mounting; he might also wear the testicles of an ass or a cock. As an antaphrodisiac, mouse dung was applied, or the testicles and blood of a cock were placed under the bed. A man's wife would turn against all paramours if he thrust a reed through a frog, from the genitals to the mouth, and then dipped it in her monthly discharges. Most curious of all is the suggestion that hairs pulled from the tail of a she ass while being mounted would make a woman conceive, and even against her will if they were knotted together while in sexual intercourse. Magical powers are likewise discernible in the use of a frog's eye, worn about the neck in natural colored wool, to cure ophthalmia.

Incantations are rare, but "according to the magicians" one could be sure of controlling his urine if he drank the ashes from burned boar's genitals and urinated in a dog's kennel, at the same time repeating the words "I do this, in order that I may not wet my bed as a dog does." While such superstitious practices make a vivid impression on the reader because of their fantastic character, we must not forget that, at the other extreme there were miscellaneous medical practices of a sensible sort. Gargles, enemas, suppositories, and fumigants were often used in a rational manner.

By and large, Pliny's materia medica covers a wide range of animals, of substances, of forms of medicaments, and of methods of application. Practically every sort of ailment, of every portion of the human body, both internal and external, is given consideration. The quality of treatment is not impressive. It smacks, not of the trained physician, but of the amateur healer. The remedies are predominantly of a simple type, usually comprising one easily procurable substance, which was combined with an herb or two, with a vehicle of wine, honey, water, oil, or grease, and applied in an obviously simple manner. In most cases one can well imagine such treatments being given by an intelligent servant or lay employee on a rural estate far from the ministrations of a professional physician. The chief exceptions are those involving magic, many of which are presented with the qualifying expression "so the magicians say." In certain passages, Pliny actually condemns the disgusting remedies that he had picked up from non-Roman sources. It is well, therefore, to bear in mind that the materia medica of the *Natural History*, ranging from the simplest of practical home remedies to the most incomprehensible complexities of superstition, was an accumulation from many ages and regions of classical antiquity. Many of them may not have been in current use. But the same, or similar, remedies, had been the property of the mass of humankind in Egypt, Greece, and Rome for ages, and were to persist throughout medieval and early modern times, up to the very threshhold of our own scientific age. Even today, many of these same remedies are prevalent among primitive races or the more primitive classes in civilized societies. In short, Pliny presents an almost universal corpus of folk medicine which illustrates the practices of preceding and succeeding ages, as well as of his own day.

Medieval and Modern Europe

Pliny's *Natural History* marks a high point in the history of animal materia medica in that it records more substances and in greater detail than

any extant work prior to the invention of printing. For well over a thousand years after Pliny the materia medica of animals (along with other medical practices) diminished in quantity and quality. With some justice this period has been called the age of "the decline and fall of Pliny."

The Latin handbooks that circulated in Western Europe during these medieval centuries were often little more than epitomes of Pliny, Galen, or Dioscorides, plus scattered accretions of contemporary folk practice. The prescriptions are often identical with those found in classical works, but they are fewer in number and sometimes contain more of magic. To convince himself of the dominance of Pliny, Galen, and Dioscorides in early medieval materia medica, one need only examine the works of Marcellus Empiricus (fourth century), Sextus Placitus (sixth century), and the seven prescription books (*receptaria*) which Dr. Henry Sigerist has published from manuscript sources of the seventh to tenth centuries (*Studien zur Gesch. d. Medizin*, 1923, XIII).

Even in the eleventh, twelfth, and thirteenth centuries, when Arabic and Salernitan writers introduced progressive ideas in many lines of medicine, materia medica continued to be dominated by the superstition and magic that had been handed down from classical times. Abundant evidence of this assertion can be found in the *Speculum Naturale* of Vincent of Beauvais, a worthy example of the great encyclopedists of the thirteenth century. The *Speculum* is strikingly similar to Pliny's *Natural History*, so far as animal materia medica is concerned. It is a rather loose and unscientific compilation of material from various sources. A separate section is devoted to each animal, with abstracts of information from classical and Arabian sources. For example, in the treatment of the cantharid beetle, one finds a general description, a brief account of the medical properties, three specific uses, and brief citations of material from Dioscorides, Haly (an Arab writer), and Pliny. In similarly stereotyped fashion, Vincent treats the various animals, large and small, wild and domestic, and also the time honored substances derived therefrom, and methods of application.

In general, Vincent, like his predecessors and contemporaries, placed great faith in animal substances of all kinds. In one passage he asserted that the blood of all animals was medicinal (XXI, 65). His English contemporary, Bartholomew of Glanville, in an encyclopedia of similar character, held that "nothing in a beast's body is devoid of medical value" (XVIII, 1). Most medieval works of the period asserted and exemplified the importance of animals, as second only to herbs, in materia medica.

If one should object to such evidences, on the ground that mere academic

compilations do not indicate that animal substances were actually used, he would be convinced by glancing at the *Thesaurus Pauperum* of Petrus Hispanus. This medical "Treasury for Poor Folk" contains the same variety of prescriptions. It was used widely during the fourteenth and succeeding centuries, and an English translation appeared in the fifteenth century. It is apparent that, amid the highly cultured and rapidly progressing civilization that produced such men as Roger Bacon and Dante, European medicine persisted in its subservience to the animal and herbal lore of the ancient world. Western healers, both professionals and quacks, continued to employ the various parts of available animals, often with such zest and naive faith that the modern world has come to think of all such remedies as typically and solely "medieval."

Likewise, many modern folk, with a naive credulity equal to that of their medieval predecessors, have taken it for granted that the much lauded Renaissance of the sixteenth century put an end to all such nonsense among intelligent people. To them it is unthinkable that revolting animal substances could have been used by enlightened Renaissance physicians. But the evidence shows that here, as in the golden age of the Roman Empire, civilized people manifest a stubborn subservience to past tradition. Human civilization, at its best, evolves slowly. Furthermore, the age of the Renaissance, with its glorification of classical antiquity, could scarcely be expected to slough off the influence of Pliny, Galen, and Dioscorides.

Due to limitations of space, the sole example we shall consider from the sixteenth century is the *Historia Animalium* of Conrad Gesner, who has been called "the German Pliny." In his *Historia* we have, for the first time, a work that surpasses Pliny's *Natural History* in quantity and quality of material concerning the materia medica of animals. Mobilizing data from Greek, Latin, Arabic, and medieval Christian sources, Gesner presented in exhaustive detail various kinds of information concerning each animal. He did not hesitate to criticize his authorities, and he listed magical and medical properties in separate categories. But his scientific spirit is more apparent than real. The superstitious and revolting prescriptions of the past are taken over indiscriminately and passed on to his readers with little more of real scientific sifting than had been shown by Pliny or Vincent. In short, Gesner presented the animal lore of the past more completely and efficiently than any of his predecessors, but neither he nor his learned contemporaries endeavored to rid materia medica of its traditional superstition. The persistence of revolting animal substances in actual medical practice during this period is vividly shown in M. Reutter's survey of

"Des médicaments d'origine humaine et animale . . . " (*La France Médicale*, 1913). The record of enlightened Europe's use of the most nonsensical and disgusting of human and animal substances, is astonishing.

The same conditions held true with little improvement, through the seventeenth and eighteenth centuries. In addition to Reutter's survey, evidences can be found in contemporary works such as Lovell's *Compleat History of Animals and Minerals* (Oxford, 1661), Becher's *Parnassus Medicinalis Illustratus* (Ulm, 1663), Pomet's *Histoire Generale des Drogues* (Paris, 1694), and Lémery's *Dictionnaire Universel des Drogues Simples* (Paris, 1733). More vivid evidence of the persistence of superstitious medical practice in high places is found in a recorded case, from England in the period of John Milton. When King Charles II was found unconscious in his bedroom, the royal physicians treated him as follows: a pint of blood was extracted from his right arm, a half pint from his left shoulder, followed by an emetic, two physics, and an enema comprising 15 substances; the royal head was then shaved and a blister raised; then a sneezing powder, more emetics and bleeding, soothing potions, a plaster of pitch and pigeon dung on his feet, potions containing 10 different substances, chiefly herbs, finally 40 drops of extract of human skull, and the application of bezoar stone; after which his majesty died.

It was only with the scientific revolution of the late eighteenth and nineteenth centuries that the European pharmacopoeia broke the bonds of ancient superstition. In most nineteenth-century handbooks of materia medica, animal substances receive comparatively little attention, and when mentioned they appear in scientific form. The optimist, however, who envisions one final absolute triumph of science over superstition, should examine handbooks such as Chatenier's *Histoire des médicaments* (Paris, 1871), and note the recommendations of animal substances, including blood, excreta, etc.

MODERN AMERICA

As one might well imagine, the record of animals in materia medica in the Americas during the modern era is similar to that of Europe. The one significant difference is the persistence, until the sixteenth century, of the primitive therapy of the aboriginal inhabitants of "Medieval" America. So far as South and Central America are concerned, I need only mention the names of scholars such as Senores Dominguez and Pardal who have recorded evidences of animal substances in the materia medica of pre-Columbian times. The substances used, the organ therapy, and the magical

procedures are strikingly like those recorded in the Papyrus Ebers, Pliny, and the medieval European handbooks. One could well imagine that the prescriptions came from classical or medieval handbooks were it not for the mention of peculiarly American animals such as the llama, condor, and puma. In *The Badianus Manuscript . . . An Aztec Herbal of 1552* edited by Miss Emmart, animal substances are common. An ointment for head lice was compounded from roots, goose fat, a burned mouse's head, and straw from a swallow's nest. For fumigating an epileptic, one burned a mouse nest and feathers of the cozcaquauhtli bird, the American substitute for the vulture of Pliniac medicine. Among the aborigine Indians of North America, animals were used for medicinal purposes, but with much of magic. Even the highly civilized Cherokee Indians resorted to weird incantations, along with their herbal and animal prescriptions (*The Swimmer Manuscript*, translated by James Mooney, Smithsonian Institution Bulletin 99, 1932).

The settlement of the Americas by Europeans in the sixteenth and seventeenth centuries made little fundamental change in the use of animals, or any other substances, in materia medica. Just as it was in Europe after the Renaissance, so also in Central and South America after the coming of the Conquistadores, traditional medical practices persisted. The seventeenth-century *Rerum Medicarum Novae Hispaniae Thesaurus* of Recchi and Terentius, contains the same variety of nonsensical prescriptions with which we have become so familiar in our survey. In North America also, the civilized white man brought with him from Europe his own brand of materia medica. Much of it was as unscientific as that of the primitive red man; however, it contained relatively little magic.

Permit me to cite my own state as an example. An eighteenth-century *Natural History of North Carolina* by Dr. John Brickell reports that, for healing, the English speaking colonists used the flesh, gall, blood, brains, bones, and dung of birds and beasts, in addition to herbs and other natural substances. So far as materia medica is concerned, these civilized white folk differed little from their Cherokee neighbors, though in surgery and certain other lines, their physicians displayed more scientific practices. Even today, according to the records of folklore societies, weird animal remedies, including magical practices, are common among negroes, Indians, and poor whites of outlying rural regions in the Southern states. Similarly primitive medical and magical practices prevail, in varying degrees, in other parts of the Americas and Europe. So far as animal substances are concerned, it is also noteworthy that their use is not restricted

solely to the medicine men and magicians of retarded sections. Throughout Europe and America, the most intelligent of people are today taking animal substances in preventative medicines, for the most part, however, in deceptively modern forms, such as serums, hormones, and vitamins. Even that household guardian of child health, cod liver oil, is now skillfully camouflaged lest hyper-civilized palates should detect its fishy taste. As for the future, it seems likely that there will be more rather than less of animal substances in materia medica. Animal plasma for blood transfusions is one of the most recent discoveries of our war time medical experimenters.

At this point we may well end our survey, without pressing the analogy of man's perennial effort to strengthen himself by blood; in primitive ages by drinking human blood, during the intervening ages by medicines containing the blood of animals, and today by direct transfusion of blood from one man's veins to another's. Suffice it to say that there are sufficient other indications of the fact that twentieth-century man, despite his superficial veneer of scientific civilization, still has a fundamental kinship with his apparently primitive ancestors of the genus *homo sapiens*. But lest I appear to be a prophet who uses the persistence of primitive customs in the past in such a manner as to inhibit human progress in the future, allow me to repeat that this survey concerns only one aspect of medical practice, one in which there is unusual lag. It is a historical axiom that the future is a scroll on which man is free to write the record of his achievements as he will, without enslavement to his past.

Notes & Queries

Edited by MAX H. FISCH

STUDENTS of the history of science — or of anything else for that matter — frequently turn up interesting details not relevant to the subjects they are investigating at the moment. Most of these details are forgotten or, at best, filed away on the chance that at some later time a use may be found for them. Yet any one of them may be the very clue that some student elsewhere needs for solving a problem or rounding out a piece of research.

On the other hand, every student is stopped short of his goal now and then, unable to proceed on the resources at hand. Not knowing where to turn, he lays his work aside on the chance that at some future time he may happen upon what he needs to complete it. Yet somewhere there are probably other students who, if the need were brought to their attention, could meet it at once.

The chief aim of the present department is to provide a medium of communication between readers with unsolved problems and readers who can solve them. It will also print historical and bibliographic notes, comments on articles published in the JOURNAL, corrections of significant errors in standard histories of medicine and related sciences, suggestions of topics for investigation, announcements of work in progress, and other news of general interest.

Contributions may be addressed to the Editor of the JOURNAL, or directly to the editor of this department, Max H. Fisch, Army Medical Library, 11,000 Euclid Avenue, Cleveland 6, Ohio.

What are the earliest references to guaiac?

QUERY No. 1. Are there any references to guaiac in documents earlier than 19 December 1517? Nicolaus Pol's *De cura morbi gallici per lignum guaycanum*, though apparently first published in 1535, is dated at the end 19 December 1517. So far as I am aware, no earlier reference to guaiac has been reported. Yet Francisco Delicado (or Delgado), in his *Il modo di adoperare il legno di India occidentale*, Venice, 1529, says that the guaiac treatment of syphilis was brought from the West Indies to Spain in 1508 and to Italy in 1517. If so, there should be allusions to it in documents of the period 1508–17, if not earlier. Fresh evidence on this point may shed light on the rise and spread of belief in the American origin of syphilis.

Who was Hieronymus Carozolus?

QUERY No. 2. Who was Hieronymus Carozolus? The first published tract on the guaiac treatment of syphilis was apparently that of the Salzburg physician

Leonard Schmaus: *Lucubratiuncula de morbo gallico et cura eius noviter reperta cum ligno indico*, Augsburg, Grimm & Wirsung, 17 December 1518. Schmaus says his tract was based on nineteen reports from the West Indies and Portugal to various German princes and leaders. The only report he refers to by name is that of Hieronymus Carozolus to Cardinal Matthew Lang. Nicolaus Pol's report to Lang was probably also among them. Can any others be identified? And is anything further known of Carozolus?

How was Lang's mission to Spain organized?

QUERY No. 3. How was Cardinal Lang's mission to Spain organized and financed, when was it sent, and how were its inquiries conducted? Paulus Ricius in a letter of 10 November 1518 to Ulrich von Hutten (which Hutten appended to his *De guaiaci medicina et morbo gallico*, Mainz, Johann Scheffer, April 1519) says Cardinal Lang "before anyone else, with his usual initiative and resourcefulness (for he is the most resourceful of men), after diligent investigation for the health of many people, brought the guaiac remedy from its remote and nearly inaccessible hiding place in Hispaniola and made it known and available to the peoples of Germany and nearly all Europe." Hutten himself says he knows some better doctors who went to Spain "in the name of the Emperor and of a certain bishop here" (Lang was then bishop coadjutor of Salzburg and the Emperor's chancellor) to investigate and report on the guaiac treatment as it was practiced by those who had learned it in Hispaniola. Surely this was one of the most curious and significant commissions of medical inquiry ever organized, yet no one has so far made a study of it. Presumably Pol and Carozolus were members. Can any others be identified? Did they go to Spain in a body? When did they go and when did they return? Who financed the mission? Perhaps the Fuggers of Augsburg? It would appear from Hutten's tract that by the winter of 1518/19 there was already a flourishing trade in guaiac wood, and that doctors were in league with merchants to promote it and share the profits. Still earlier, in a letter from Augsburg of 25 October 1518, Hutten says: "I myself am convalescing in wonderful fashion, thanks first to Christ and then to the Fuggers, or rather to all who have had a hand in bringing me this salutary remedy against the pestilent disease which has been the despair of doctors for so many years." (*Opera*, ed. Böcking, I, 212.) A few years later, in 1525, Paracelsus saw the heyday of the guaiac trade and of the guaiac cure in the Holzhaus at the Fuggerei in Augsburg. In many passages of his works he links Lang with the Fuggers. He repeatedly inveighs against the doctors for taking refuge "under the Cardinal's hat" and for running to the Fuggers' store to help them unload their wood. "The spiritual and worldly traders (odd as it is to make wood an article of trade) have brought you doctors a wood, and you have taken your medical theory and practice from them." "The red hat and the Fuggers' wagons have brought the wood but not its virtue." "Didn't you learn anything at school, that you must now learn your art from the Fuggers and let the Cardinal play schoolmaster to you?" (*Sämtliche Werke*, ed. Sudhoff, VI, 312, 327 f., 420, VII, 418.) Anyone who can shed further light on Lang's mission and

its relation to the guaiac trade and to the doctrine of the American origin of syphilis will be making a notable contribution to the history of medicine.

Who was Narcissus Parthenopeus?

QUERY No. 4. Who was Narcissus Parthenopeus? In dedicating to him the *Tabulae sex*, Vesalius calls him master and patron, first physician to the Emperor Charles V, and inspector-general (*censor*) of the physicians and pharmacists of the Kingdom of Spain and Naples. He ascribes to him an incomparable command of several languages and exceptional knowledge of anatomy as well as of medicine and philosophy. He asks him to receive the *Tabulae* "with the same graciousness with which you once received myself, when you declared yourself, with many tokens of benevolence, as most kindly disposed towards me." In his letter to Oporinus about the printing of the *Fabrica*, in a passage suppressed in the second edition, Vesalius refers to him as "Narcissus Vertunus, first physician of the Emperor and of the Kingdom of Naples, and rare model of the physicians of our time." Zwinger (in his *Theatrum vitae humanae*, quoted by Roth, *Andreas Vesalius*, p. 90, n. 2) says: "Narcissus Neapolitanus, skilled and fortunate physician in constant attendance upon Charles V from the latter's youth, served him with good success not only on other occasions but also at Bologna, where he suffered from a very severe quinsy shortly before he was crowned Emperor" by the Pope on February 24, 1530. Stirling-Maxwell, in the introduction to his facsimile edition of the *Tabulae* (apparently on the authority of Nic. Toppi, *Bibliotheca Napoletana*, Napoli, 1678, p. 218), calls him Narciso Verdunno and says he became first physician to the crown of Naples in 1520 and first physician and councillor to the Emperor in 1524. As I have noted elsewhere (*Bull. Med. Lib. A.* 33: 252 n. 1, 1945), we know from a letter of Guillaume van Male to Louis de Flandre in April 1552 that Vertunus retained his post as first physician until his death at Naples in 1551 or early in 1552. Dr. Charles Singer in a recent letter says: "The name [Narcissus Vertunus] has always puzzled me. It is a very odd one indeed. I have a vague theory that his real name was Giardino or something of that kind and that Vertunus stands for Vertumnus. Vertumnus was a god of gardens or gardeners — a very obscure deity. I think it is one of those idiotic humanist name-changes. Narcissus must similarly represent something else.[1] The man is a puzzle, but I don't think I have ever read anything more fulsome than the dedication of Vesalius to him. The butter is spread too thick even for a sycophant humanist! There is, I think, something at the back of the relationship between these two men that has not yet emerged." Can anyone shed further light on the matter?

[1] In a subsequent letter Dr. Singer adds: "Narcissus is known in medieval times as a first name, but it is extremely rare except in the very early Christian centuries. It is not a name most people would very readily use. There was, however, a certain Narcissus de Verduno, apparently a Spaniard, who was Bishop of Miletus and died in 1477. His Verduno was, I suppose, Verdú in Catalonia." There is an account of this Narcissus in the memoirs of Vespasiano da Bisticci (Angelo Mai, *Spicilegium Romanum*, I, 306–9). He was at Naples for a time before receiving the bishopric of Mileto in the province of Catanzaro in Calabria. It is possible, therefore, that our Narcissus was a relative of his.

The plague at Como, 1486

IN a 1486 vellum manuscript in the Army Medical Library (De Ricci & Wilson, I, 451, no. 2) containing selections from Hippocrates, Galen, and Avicenna, in Latin translation, there is a poignant record (f. 160^{v}) of the spread of the plague around the shores of Lake Como. It may be translated as follows:

> The fourth Fen of the first book of Avicenna's *Canon* was finished by me, Pietro Rondono, doctor of arts and medicine, in the territory of Armeno, to which I had gone from Bellano because of suspicion of the pest, in the year of our redemption 1486, on the 25th day of the month of October, the second hour of the night, before dinner.
>
> Meanwhile there has been a serious outbreak of the pest at Bellano. It has been spreading for six years now around the Lake, occurring once at Bellano, then once at Como, twice at Sorico, twice at Domaso, twice at Dongo, twice at Musso, Pianello, and Cremia (where almost everyone died), once on the mountain above Rezzonico and once at Rezzonico itself, four times at Nobiallo, three times at Menaggio, six times at Loveno, and once at Varenna. And so it has gone on for six years, and now it is at Bellano.

DOROTHY M. SCHULLIAN

Charles Bell and Samuel Borrowe

THE Army Medical Library has one of the three recorded copies of Charles Bell's 1811 pamphlet, *Idea of a New Anatomy of the Brain.* The title page (reproduced in *Medical Classics* 1^{2}: 104) bears the inscription: To Doctor S. Borrow[e]/ w^{t} M^{r} Bell['s] Comp[ts].

In one of Bell's notebooks there is a list of "Names to whom copies of the Idea of the Anatomy of the Brain have been addressed." (*Journal of Anatomy and Physiology* 3^{1}: 169 n. 2, 1868). One of the entries in this list reads: Dr. Burrowe, Philadelph. Dr. W. B. McDaniel, 2d, kindly writes that he has been unable to trace any Dr. S. Borrowe or Burrowe in Philadelphia records of the period. It is probable that the recipient of this copy was Dr. Samuel Borrowe of New York.

Samuel Borrowe was born in 1766 and died in 1828. His obituary in the *New-York Medical and Physical Journal* (7: 165, 1828) reads as follows:

> Died on the 28th day of March, 1828, in the 63d year of his age, Samuel Burrowe, M.D. He was one of the oldest of our medical practitioners, and in his day enjoyed a large share of public confidence and professional character. He practised Physic and Surgery for nearly forty years, having been educated to the Profession under the late Dr. Charles McKnight. At the organization of the medical school attached to Columbia College, he was one of the five first graduates in medicine, and the last surviver of them; for many years he was one of the Surgeons of the New-York Hospital, and one of the consulting Surgeons of the Eye Infirmary, from its first establishment in this city.

Except for a few short papers, Borrowe's only publication was his thesis: An inaugural dissertation on the cynanche trachealis. Submitted to the public examination of the Faculty of Physic, under the authority of the Trustees of Columbia College in the State of New-York, William Samuel Johnson, LL.D., President, for the degree of Doctor of Physic, on the thirtieth day of April, 1793. By Samuel Borrowe, Citizen of the State of New-York. 35 pp., sm. 8°. New York, T. and J. Swords, Printers to the Faculty of Physic of Columbia College, 1793. The Army Medical Library copy is inscribed: Doctor Buxton from his Friend the Author. Borrowe concludes that the cure of cynanche trachealis is to be effected by "blood-

letting, blisters, emetics, warm bath, and calomel," and as proof of the propriety of his plan he subjoins five cases "which were successfully treated by it."

His great-granddaughter, Miss Effie Beekman Borrowe, writes: "My great grandfather never went abroad. He had, however, correspondents in England, one of whom may very well have been Sir Charles Bell. . . . Any letters, if there were such, were undoubtedly destroyed. . . . I do not think there can be any doubt about the identity of 'Dr. S. Borrowe.' There have been very few of our name in this country." She adds that he never lived in Philadelphia.

For a few years at the turn of the century, Dr. Borrowe served as secretary of the Medical Society of the County of New York, a forerunner of the present association of that name. In that capacity he may have exchanged letters with physicians and surgeons abroad, and with Charles Bell among them. The minutes show that while he was secretary Dr. John Coakley Lettsom was made an honorary member, so that Borrowe must have had some correspondence with him.

Borrowe was surgeon to the New York Hospital for twenty-two years, and two of his sons were later on its staff. He was partner for a time of Thomas Cock, M.D. He was a member of the Medical Board of the New York Institution for the Inoculation of the Kine-Pock, organized in 1802. He was a trustee of the College of Physicians and Surgeons, 1820–1828.

The only other American recipient of Bell's *Idea* was Dr. William Gibson, professor of surgery then at the University of Maryland and later at the University of Pennsylvania. He had been a private pupil of Bell's in London. Gibson lent his copy of the *Idea* to Dr. Nathaniel Potter, editor of the *Baltimore Medical and Philosophical Lycaeum*. That journal reprinted it in number 4 of volume 1, for October, November & December 1811, which was probably published in 1812, ten years before the first public notice of the *Idea* in Great Britain. Gibson named one of his sons for Bell. That son, Charles Bell Gibson (1816–65), became professor of surgery at the Medical College at Richmond, Virginia.

I am greatly indebted to Miss Gertrude Annan, Miss Janet Doe, and Miss Bettina G. Thrall, of the New York Academy of Medicine Library, in addition to Dr. McDaniel and Miss Borrowe, for help in identifying "Doctor S. Borrowe." I should welcome further details, especially regarding his relations with Charles Bell.

An early antimalaria campaign

In a short survey of the history of malaria in the U.S.A., recently published in *Ciba Symposia* (vol. 7, no. 3–4, June–July 1945), I drew attention to the fact that in spite of the successful American antimalaria campaigns in Cuba (1900) large scale malaria control was applied in this country only in 1912–1913. The amount of space available to me at the time did not allow me to mention that in several isolated localities in the U. S. antimalarial work along the lines of Ross, Gorgas, *et al.*, started much earlier. I am glad that this particular feature of this new Journal gives me an opportunity to repair this omission and to render justice to those

early pioneers whose work was all the more praiseworthy as they had to act without antecedents or official backing.

As an example of such an early antimalaria campaign I would like to mention the activity of Dr. J. M. Barnett of Albany, Georgia. In 1902 Dr. Barnett became the physician of Pretoria, a mill village with a population of 3000, thoroughly infested with malaria and blackwater fever, located in Dougherty County, Georgia. Dr. Barnett applied screening, bednetting, drainage, oiling, and quinine. The results were so obvious that ever since Dougherty County under the leadership of its Board of Health has been leading in malaria control work.

ERWIN H. ACKERKNECHT

Book Reviews

MADGE E. PICKARD AND R. CARLYLE BULEY. *The Midwest Pioneer. His Ills, Cures, and Doctors.* Crawfordsville, Indiana: R. E. Banta, 1945. 339 pp., illustrated. $5.00.

IT is not often that a book can be said to represent the answer to a historian's prayer, but of the recent publications in the field of medical history this is most certainly true of the volume under reivew. Pickard and Buley's *Midwest Pioneer* is outstanding for several reasons. In the first place, it is the first general history of pioneer medicine in the Middle West, and secondly, the authors treat their subject not only from a bio-bibliographical point of view, but also from a broad approach which correlates the other factors (i.e., [illegible], economic) that enter into the medical history of a people.

Several years ago the present writer called for a broader approach to the writing of medical history (George Rosen: A Theory of Medical Historiography, *Bull. Hist. Med.*, 1940, 8: 655–665; Ibid.: Disease and Social Criticism. A Contribution to a Theory of Medical History, *Bull. Hist. Med.*, 1941, *10:* 5–15), and recently the same issue has been raised more specifically for American medical history (Genevieve Miller: The Study of American Medical History, *Bull. Hist. Med.*, 1945, *17:* 1–8; Whitfield J. Bell, Jr.: Suggestions for Research in the Local History of Medicine in the United States, *Bull. Hist. Med.*, 1945, *17:* 460–476). The general view of these discussions is that the medical historian must take medicine as part of a society, and not as existing *per se* in a vacuum. The starting point for the study of medicine in any period must be the patient and the doctor as individuals in a particular social environment. From this the historian should proceed to the health problems of the specific society, and study how they presented themselves in the patient and to the doctor. He should study how the doctor dealt with these problems, what knowledge and techniques were available to him, and what innovations appeared. Furthermore, what were the existing social and scientific limitations that medicine did not or could not transcend? How was the medical profession trained and organized, and what effect did these factors have on medical practice? What was the attitude of the patient toward the doctor? What social forces impinged on medicine and influenced its development? In short, the medical historian should present the medicine of a particular period in its social perspectives.

This task has been accomplished by Pickard and Buley for American pioneer medicine of the first half of the nineteenth century. The authors deal in succession with the diseases that afflicted the newcomers (malaria, smallpox, diphtheria, lockjaw, cholera, typhoid, milk sickness, etc.), home remedies and domestic medicine, the regular medical profession, medical quacks and sectarians, the organization of the medical profession, pioneer pharmacy and patent medicines.

Scientific medicine was still in the making, and the quality of medical care on the frontier was not high. Small wonder then that quacks and sectarians (Eclectics, Homeopaths, Thonsonian Botanists, and Phrenologists) flourished. The authors also point out that patent medicine advertisements provided the chief financial basis for the pioneer press. Their finding that the lay public was often intensely hostile to the regular medical profession corroborates a phenomenon previously pointed out by R. H. Shryock and B. J. Stern.

A very minor error in this reviewer's opinion is the credit given to Dr. Sappington for the introduction of quinine to the Middle West.

Finally, it must be pointed out that the typography and binding of the volume are a fitting dress for the content. There is an index and a section on bibliography. — GEORGE ROSEN

EDWARD KREMERS. *Documents Pertaining to the Medicinal Supplies within the North American Colonies from 1643 to 1780.* Introduction and Supplement by George Urdang. Madison, Wis.: American Institute of the History of Pharmacy, 1944. 194 pp.

AFTER his retirement as the Director of the Wisconsin University School of Pharmacy in 1935, the late Edward Kremers undertook the publication of important documents pertaining to medicinal supplies in the American colonies. Between 1937 and 1940 Dr. Kremers published four of these documents in the *Badger Pharmacist.* These four papers have now been collected and republished in one volume by the American Institute of the History of Pharmacy. To these documents Dr. George Urdang has given an introduction, and added his commentary to the *Lititz Pharmacopoeia,* of which he succeeded in establishing the sources.

The documents contained in this volume are:

(1) *Receipts to Cure Various Disorders* (1643) prepared by Dr. Ed. Stafford of London for Governor Winthrop of Connecticut.

(2) *A Drug List of King Philip's War* (1676) contained in a letter addressed by "Doct." William Locke to the Bay Colony in 1675 urgently requesting medicaments.

(3) The *Lititz Pharmacopoeia* (1778), a list of remedies for use in American military hospitals during the Revolutionary War. It was prepared by Dr. William Brown, Physician General of the Middle Department in Lititz, Pa., from which the document takes its name.

(4) The *Compendium Pharmaceuticum* (1780) prepared by Jean François Coste, surgeon general of the French expeditionary forces sent to this country under Rochambeau, for use in the French military hospitals.

These documents are reproduced in facsimile, translated and provided with copious annotations. Every student of American medical and pharmaceutical history, and of American culture is deeply indebted to Dr. Urdang and the American Institute of the History of Pharmacy for this valuable source book. — GEORGE ROSEN

Owsei Temkin. *The Falling Sickness*. Baltimore: The Johns Hopkins Press, 1945. 380 pp., illustrated. $4.00.

Intertwined with the history of neurology and of magic, is that of epilepsy. Although nervous diseases and spiritual influences form a vast background of amorphous limitations, epilepsy, as pointed out by Temkin, was always considered a disease. It could hardly have been otherwise, in view of the uniform pattern of the attack and the state of temporary unconsciousness that accompanied the gross manifestations. Almost at once, a writer in the Hippocratic era, attacked the "sacred" character of the disease and from 400 B.C. to Hughlings Jackson's "Study on Convulsions" in 1870, investigators and commentators repeatedly considered the brain as the seat of the disorder, although the fight against the supernatural and occult theories of causation occupied much of the seventeenth and early eighteenth century literature, and even today, many laymen seek spiritual cures for relief.

Dr. Owsei Temkin, associate professor of the History of Medicine at the Johns Hopkins University, reviews this long history in a well documented monograph of over 300 large pages. The bibliography, unusually complete, gives more than 700 references. Written in a scholarly style, with page footnotes of practical value, this book sets a high standard of excellence in a full survey of the history of epilepsy up to about 1870. The format is pleasing and the pages are remarkably free from minor errors. Temkin's volume is a credit to the Institute of the History of Medicine and to its distinguished director, Dr. Henry E. Sigerist. — Henry R. Viets

Norman Taylor. *Cinchona In Java, The Story Of Quinine*. With an Introduction by Peter Honig. New York: Greenberg, 1945. 87 pp., illustrated. $2.50.

This booklet represents one of the most pleasantly and nevertheless authoritatively written publications on cinchona, its cultivation and importance ever offered to the layman. In contrast to its subtitle, it does not tell the story of quinine or only a very small part of it, just enough to have it in the picture and to use it as a proof for the importance of quinine therapy, hence of the cultivation of cinchona and the excellence of the work done in Java in achieving cinchona barks with an unparalleled quinine content. As a matter of fact, whatever general information is offered serves merely as a kind of background for the main subject: cinchona in Java.

The real purpose of this booklet is to make the value of the cultivation of cinchona in Java for the treatment of malaria as obvious as possible. In other words, this booklet has a very definite politico-economical tendency. At a time in which the problem of colonies of European nations in Asia and Africa has become a matter of general discussion and, maybe, reconsideration, this booklet testifies to the benevolent consequences that European rule and care in some cases may have for everybody concerned, the rulers and caretakers as well as the natives and, last but by no means least, the world at large. In the special case of the cultivation of

cinchona in Java, the conclusion seems to be obvious — although not stated by the author *in expressis verbis* — that the world cannot do without.

Thus it is understood that the historical and sociological contents of the book are of far greater interest than the scientific ones. The introduction describing the planned agricultural economy in Java keeping the balance between "subsistence-crops" (food etc.) and "culture-crops" (cinchona, tea, etc.), the details about the organization of the cinchona culture and its gradual development, and finally the chapters dealing with the unsuccessful British and the successful Dutch attempts at developing cinchona cultures with a high and stable yield of quinine, are very interesting.

The assumption of Taylor that only a few South American "shrubs or trees are of the slightest interest as far as the production of quinine is concerned and that even these have been wholly supplanted by varieties that originated in Java long after the tree was taken from South America to that island," seems to be confirmed by the report on "The Cinchona-Bark Industry Of South America" by William Campbell Steere in *The Scientific Monthly*, 1945, *61:* 114–126.

A good presentation of a good cause, containing much valuable information of general interest, Taylor's booklet will certainly find the consideration and attention which it deserves. — GEORGE URDANG

J. M. D. OLMSTED. *François Magendie, Pioneer in Experimental Physiology and Scientific Medicine in XIX Century France.* New York: Schuman's, 1945. 290 pp., illustrated. $5.00.

THERE is a special atmosphere which surrounds the life and the work of the men who led the great French school of medicine at the time of its splendor, when Paris was the center of medical studies and students and doctors from all parts of the world crowded the classes and the laboratories. There is in all these great Frenchmen of by-gone days, however different their personalities, their temperaments, and the importance of the work they accomplished, a charm connected with the Gallic spirit, with its characteristic frankness and independence of thought and action, and brilliance of expression which attracted students and followers.

Among the men of science of that time, François Magendie takes a foremost place. He was a man of strong will, able to prepare a great work and to bring it to full fruition, interested in all problems and willing to face all difficulties. This teacher and research worker, was at the same time a restless man with an impetuous temperament, strong in his attacks but generous in admitting his errors. His life is connected with some of the most important phases of French history. A son of the Revolution, he became a professor at the University which Napoleon founded, and witnessed the fall of the empire. He saw the restoration of the Bourbons in 1814 and their deposition in 1830, the revolution of 1848 and the establishment of the second French Republic with Louis-Napoleon as its President. But his work continued uninterrupted, the work of a great scholar and a prominent teacher.

Dr. J. M. D. Olmsted, Professor of Physiology at the University of California, to whom we owe a beautiful volume on Claude Bernard, has now written a biography of Magendie, to which J. F. Fulton has written an eloquent preface, which presents an exhaustive study, of the life and the work of the great physiologist. It was not an easy problem to pronounce judgment on the scientist about whom so much had been written by his contemporaries and his followers. Dr. Olmsted stresses the importance of the contemporary biographical portraits and marks the different points of view from which the former biographers had started in their judgment. He tries to give a complete portrait of Magendie and I believe that he almost succeeded in his difficult task.

Magendie was born in Bordeaux, the son of Antoine Magendie, a surgeon who played a part in the Revolution. The family came to Paris in 1791 when the open insurrection was prepared. Citizen Magendie became a member of the *Commune* in 1793 and was appointed administrator of public establishments at the time of Robespierre. He was thrown into prison on the charge of neglect in the supervision of the Foundlings Asylum, but was soon released and became Mayor of the Tenth Arrondissement. He acted on Rousseau's principle of allowing children perfect liberty and his son soon outstripped his classmates, and when fourteen won a grand prize for his essay entitled "On the Knowledge of the Right of Man and the Constitution." The young Magendie began his medical studies at a time when an attempt was made to organize medicine and surgery on an unexampled scale. He became a pupil of Boyer who had already achieved fame as a surgeon, and began diligently to study anatomy at a time when Bichat, a brilliant teacher, was giving his lectures at the Hôtel-Dieu, and Dupuytren was most successful as a teacher of physiology and pathological anatomy.

Magendie took time off from his studies to frequent the brilliant salons which came into fashion again after the Revolution. In 1801, Napoleon announced his intention of reforming public instruction, and in 1806 the Imperial University was created. He soon passed his examination, and in 1808 obtained the degree of Doctor of Medicine.

The relation of Magendie to Bichat and the rebellion against Bichat's doctrine, the presentation of his first experimental work on pharmacology before the Paris Academy of Sciences, the about face from anatomy and surgery to physiology form the subject of three interesting chapters of the book. In 1814 the Academy of Science demanded exemption from military service for the brilliant young physiologist, and obtained it. He continued his experiments on the connection between nausea and swallowing of air and published his textbook of physiology in 1816. The book was well received and went through four French editions. It insisted on the necessity that "facts and facts alone" are the foundation of science, and that the vital or animal spirits of the ancients, Galen's *faculties*, the *archaeus*, the vitalism are but "arbitrary guesses which have served for centuries to hide utter ignorance of the cause of life." His reputation was growing, and he published a series of papers on physiological subjects. He became in 1820 President of the Société Médicale d'Emulation and to his vigorous administration is due the credit for the

prosperity of the society. Magendie always played an important role as contributor to and as editor of medical journals and his most important achievements were published in the journal which he began in 1821 and which was very well received.

In 1821 he became a member of the Academy of Science. The story of the famous controversy between Bell and Magendie is told very exactly and with many interesting details by the author who, taking into consideration the original contribution of both scientists, their criticism and the judgment of doctors and scientific societies at the time, arrives at the conclusion that all credit for the discovery of the distinction between sensory and motor function has to be given to Magendie; the only distinction between the function of the spinal nerve roots actually demonstrated by Bell was a difference in the degree of their excitability and nothing more.

In the following chapter of this book Dr. Olmsted deals with the contribution of Magendie to the physiology of the central nervous system his work on cerebrospinal fluid and the story of his political affiliations and their consequences. Magendie was charged with fostering the philosophy of Rousseau, plunging the scientific world into fearful darkness which augmented confusion. However, a couple of months later in September 1830 after the triumph of liberalism, Magendie was called in the same Journal "the most skillful physiologist of our age." In 1831 Magendie began his courses at the Collège de France.

His professional activity was very successful, and his lectures were published and republished many times. His experiment on recurrent sensibility gave rise to another contest with Longet, but his fame as an experimental psychologist was already established. The great work of Magendie as collaborator of Claude Bernard and in the Committee of Public Hygiene is studied by Olmsted in some detail. He gives a clear conception of the splendid work that this great physiologist accomplished, especially in the field of neurology, and presents a portrait of a man who played a decisive role in the history of medicine and whose work is considered one of the major contributions to the progress of physiology.

Not only for the historian, but also for the physiologist and for all those who believe that it is important to be acquainted with the fundamental work accomplished by the great men of the past, this book by Dr. Olmsted will offer pleasant reading and at the same time a fascinating presentation of valuable information collected with sound criticism and complete impartiality. — ARTURO CASTIGLIONI

NOTES ON CONTRIBUTORS

Erwin H. Ackerknecht, M.D., Assistant Curator of Physical Anthropology at The American Museum of Natural History and formerly research fellow at the Johns Hopkins Institute of the History of Medicine, is the author of *Malaria in the Upper Mississippi Valley, 1760–1900*, recently published by the Johns Hopkins Press.

Phyllis Allen, formerly of the Department of History at the University of Rochester, is at present studying American medical history with Dr. Richard H. Shryock at the University of Pennsylvania.

Max H. Fisch, Ph.D., is head of the Rare Book Division at the Army Medical Library and author of *Philosophy in America from the Puritans to James* (with Paul R. Anderson) and the *Autobiography of Giambattista Vico*, a translation with T. G. Bergin.

Loren C. MacKinney, Ph.D., is professor of medieval history at the University of North Carolina and the author of *Early Medieval Medicine* and *Medieval World*.

Pat Ireland Nixon, M.D., physician in San Antonio, Texas and author of *A Century of Medicine in San Antonio*, is now engaged in writing a history of Texas medicine.

Charles Donald O'Malley, Ph.D., professor of history at Stanford University and Research Associate in Medical History at University of California in the field of sixteenth century medicine and anatomy, is the author of *Vesalius as Clinician; Saint Apollonia, Patroness of Dentistry; Readings from the Fabrica of Andreas Vesalius* and translator of Fallopius' *Observationes Anatomicae*.

Jane M. Oppenheimer, science faculty member at Bryn Mawr, has written a work on the Hunters to be published by Henry Schuman in the Spring.

Curt Proskauer, D.D.S., leading historian of dentistry, is the author of *The Dentist in Art* and editor of *Cultural History of Dentistry*.

George Rosen, M.D., Ph.D., Editor of the Journal, is the author of *The Reception of William Beaumont's Discovery in Europe, The History of Miners' Diseases* and *The Specialization of Medicine*.

John B. de C. M. Saunders, F.R.C.S., professor of anatomy at the University of California, has done outstanding work in the history of anatomy with emphasis on translations of Vesalius — *China-Root Epistle, Venesection Epistle* (with C. D. O'Malley).

Charles Singer, M.D., is one of the world's foremost historians of medicine and science whose many books in the field are universally recognized as the most authoritative of their kind.

Josiah Charles Trent, M.D., F.A.C.S., instructor in thoracic surgery at the University of Michigan Hospital, is at present at work on a biography of the great controversial New England figure, Benjamin Waterhouse, and a comprehensive *Classics of Surgery*.

George Urdang, Ph.G., D.Sc.Nat., is the leading historian of pharmacy and Director of the Institute of the History of Pharmacy at Madison, Wisconsin.

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By Owsei Temkin

Oliver Wendell Holmes once wrote: "If I wished to show a student the difficulties of getting at truth from medical experience, I would give him the history of epilepsy to read." Such a history, however, if written from one arbitrary point of view, might easily be misleading rather than enlightening. This being the case, there seems but one way left. We must above all find out what was meant by epilepsy, what symptoms were attributed to it, how it was explained and how treated. This means we must take the past seriously and try to understand it. And this implies that we must study the opinions of laymen, philosophers and theologians, as well as those of physicians. For this reason the popular name, "the falling sickness," known to every reader of Shakespeare's "Julius Caesar," seemed an appropriate title for this book.

The book begins with the ancient Greeks who have left us the earliest western writing on epilepsy, and it continues to the point where the historical perspective ends and the present debate begins. This point seems to lie about the year 1880, when the impact of Jackson's and Charcot's work made itself felt. Hughlings Jackson outlined a neurological theory of epilepsy, while Charcot, on the other hand, separated epilepsy and hysteria more emphatically than any of his predecessors had done. Both men confined epilepsy to the realm of neurology, thereby dissolving the vague but more comprehensive concept of "the falling sickness." This separation was not the final word, but it impressed itself strongly upon the mind of a generation. For a book on "the falling sickness," this seemed the proper place to stop.

After what has been said, it will become understandable why this book, though medical in intent, has to deal with many cultural aspects of epilepsy. Its aim throughout is to understand the past in order to help to understand the setting of present problems, and to show that our views of epilepsy have emerged as the result of complicated religious, philosophical, social as well as strictly medical developments.

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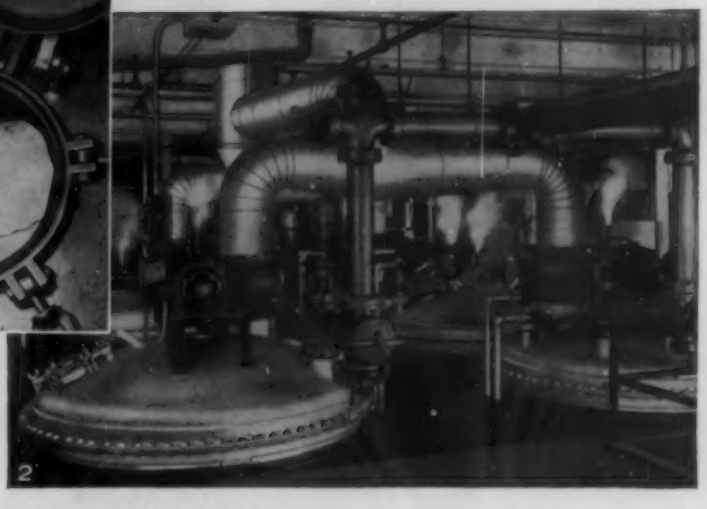

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